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## PRELIMINARY REVISION OF THE GENUS *DRYMARIA*

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### ABSTRACT

For the first time since the days of DeCandolle, a revision of all the known species of *Drymaria* is presented. The species are arranged in seventeen series, and keys are provided to the forty-eight species recognized. Illustrations, mostly based on type material, and morphological descriptions are provided for each species. Two new species, *D. barkleyi* and *D. conzattii*, are described, as well as several new infraspecific taxa. JAMES A. DUKE, Missouri Botanical Garden, 2315 Tower Grove Ave., St. Louis 10, Missouri.

### INTRODUCTION

The genus *Drymaria* comprised four species at the time of its establishment by Willdenow (in Roem. & Schult. Syst. Veg. 5:406. 1819). Less than 150 years later the number of names has multiplied more than thirty-fold, with most of the novelties being described before the turn of the present century. No complete revision has been attempted since this prodigious multiplication of epithets. Wiggins (in Proc. Cal. Acad. 4<sup>25</sup>:189. 1944) has completed an able revision of the genus as represented in the vicinity of the Sonoran Desert. His conclusions were quite sound, and the only consequential differences expressed in the present paper are mere matters of heirarchic reduction.

In addition to Wiggins, the most important recent American studies on *Drymaria* have been pursued by Fosberg, who has clarified many of the problems created by M. E. Jones, proposed a few new taxa, and made several appropriate reductions, both in the literature and in various herbaria. Macbride's account in the Flora of Peru, although promulgating a few errors, has been a forward step toward understanding the genus in an unusually complicated region, where speciation in *Drymaria* has run rampant. I. M. Johnston's studies in the equally perplexing Coahuilan Desert have resulted in the description of some of the most bizarre species of *Drymaria*. The major contributor from Europe has been the late Dr. Mattfeld whose discerning work has been responsible for the recognition of several new South American species, all of them herein maintained. He has also clarified some of the errors stemming from the work of his predecessor Briquet, who described several new Mexican species, two of which were probably based upon Pavon's Peruvian collections.

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## GROSS MORPHOLOGY

An amazing array of characters is exhibited in the genus, and will doubtless tempt the description of minor variants. The petals, for example, are nearly as variable as those of *Silene*. Almost every portion of the plant has been utilized as a taxonomic tool at one place or another in the genus.

Various habits are assumed by members of the genus. Perhaps most common is the clambering and sprawling habit exhibited by *D. cordata*, which occasionally roots at the nodes. Erect suffrutescent perennials are not uncommon, and may raise an eyebrow on those not intimately familiar with the genus. Depressed subcespitose forms such as occur in some varieties of *D. effusa* recall some species of *Arenaria*, while delicate subvirgate annuals such as *D. leptophylla* may suggest *Stipulicida*. Too often, the duration has been used as a key character, but the duration of a plant is frequently a function of the environment. Plants grown in more xeric habitats often exhibit more attributes of a perennial.

Although the leaves of most species are of an ovate type and often cordate at the base, every extreme, from linear and subsucculent to reniform and membranaceous, is found in one species or another. The leaves are usually entire, but undulations occur in the leaf margins of some South American species. The opposite arrangement prevails, but in a few series pseudoverticillate leaves are common. Venation of the leaves is usually obscure and rarely of taxonomic significance, but the texture and pigmentation occasionally aid in identification. The petioles may be as long as the blades or completely obsolete. Most species have stipules which may be entire, bifid, or irregularly lacerate, and the nature of the division is of occasional importance as a taxonomic criterion.

Indumental variations are often called upon for specific delimitations. Septate or moniliform hairs occur in several species. Forms of *D. villosa* may be hirsute or villose in nature; forms of *D. ovata* are best described as lanose; stipitate or sessile glands are present in many species. In *D. cordata* the glands commonly take the form of a conspicuous farinose girdle on the pedicels. The indument is usually more or less translucent, but is not uncommonly white, or even reddish or yellowish. Completely glabrous species occur, and some of the xeromorphic and halophytic species are decidedly glaucous.

Predominating in the genus is a terminal cymose inflorescence, but here again, numerous departures from the norm exist. In most species with the leaves pseudoverticillate, the flowers reflect this arrangement. Rarely the flowers may be solitary or clustered in the axils of barely modified leaves, but more commonly each flower is subtended by more or less scarious bracts. Many inflorescences show racemose tendencies; in *D. anomala*, the first and sometimes the second branches of the inflorescence are dichasial, but subsequent branching tends to be monopodial. Proportionate lengths of bracts, pedicels, peduncles and flowers, as well as relative variations in their induments, have been used in distinguishing species.

Almost invariably there are five sepals in a flower, but aberrant flowers are known with four or six sepals. The sepals are most commonly lanceolate or ovate but in some they are nearly orbicular and in others nearly deltoid. One to nine nerves may traverse each sepal, the 3-nerved sepal being most prevalent. In some

few species the venation is more or less dendritic and in others so obscure as to be difficult of interpretation. Occasionally the sepals are conspicuously carinate or cucullate. Shape, apex, nervation, indument and comparison of the sepals are frequent taxonomic tools.

Petals are usually five in number, but three is characteristic of certain species, and the petals are absent or drastically reduced in *D. apetala* and in forms of *D. villosa* and *D. xerophylla*. Typically the petal is bifid for about half its length, but this basic construction is hard to visualize in some of the members of the first few series whose ornate petals are so bizarre as to defy terse terminology to describe them. The lobes in some more easily described forms are merely basally auriculate, the nature of the auricles being quite variable, as are the venation and apices of the lobes. Most of the bilobed petals are tapered directly to a narrow claw, but in some members (e.g. in Series FASCICULATAE) there is a longer or shorter trunk interpolated between the lobes and the claw. In some forms (e.g. Series HOLOSTEODES) the trunk never narrows to a claw; such forms are herein referred to as exungiculate. The lobes of the bilobed petals are 1-many-nerved, the 1-nerved condition being characteristic of the Series CORDATAE, and certain species in other series.

Less constant in number than the petals are the stamens, which are occasionally reduced to two in number. In species with the reduced stamen number, the anthers are often abortive, and tend to be more orbicular than in those species possessing the higher number of stamens; in pentandrous flowers the anthers are usually oblong. Not infrequently the filaments are shallowly connate into a cup, and there are occasionally minute staminodial flaps alternating with the filaments on such a cup. Rarely, as in *D. stipitata*, there are conspicuous saccate staminodia. In the Series FRUTESCENTES occasionally floral dimorphism suggests that monoecism is in the early stages of evolution.

Offering little in the way of systematic clues is the gynoeceium. In a few species the ovary is borne at the summit of a rather prominent stipe, the presence of which does not seem to be necessarily constant. Some species, which are also characterized by the development of staminodia, have a rather prominent stylopodium atop the ovary. In most species, there are three styles, but occasionally there may be two or four. Such numerical variations have been observed in a single inflorescence. The degree of fusion of the styles on the other hand seems to be a more reliable taxonomic criterion, the styles being fused to a greater or lesser degree in most species. Only with hesitancy do I use the word *fused*; it would seem to be just as well to speak of one style with three branches as to speak of three styles partially fused. For the sake of tersity, I have often described the style as being bifid or trifid half its length, when it might have been more correct morphologically to say that there were two or three styles fused for half their length. Interestingly the two or three styles are almost completely free in *D. cordata*, a species which has the most reduced androecium, and a species which I would judge to be one of the most advanced in the genus.

The capsule may be three-valved or two- or four-valved, correlated with the number of styles. Rarely the size of the capsule may be diagnostic. Inside the

capsule, 1—many of the campylotropous ovules may mature into seeds, and the seeds have proven very valuable in the taxonomy of the group. The number, shape, color and sculpture of the seeds all play some part in species determination. Most species are characterized by many-seeded capsules, but in the Series CORDATAE, some occasionally mature only one seed per capsule. The seeds may assume any of several shapes. Perhaps most common is the cochleate, or snail-shaped seed, characteristic of Series CORDATAE. Foetiform seeds, shaped much like the human foetus, are found in the Series HOLOSTEOIDES, and the vestiges of this shape are retained in some subsequent groups. Ampulliform, or retort-shaped, seeds occur in *D. debilis* and this shape is approached by a few species of other sections. The seeds of *D. viscosa* are unusual not only in being lacrimiform, but also in being smooth, dull and yellowish. Many members of the earlier series have hippocrepiform seeds and species of the Series LYROPETALA have hairs on the hump of the horseshoe. Seeds of most species are characterized by various kinds of sculpture. In the earlier series the seeds are merely granular, if we exclude the hairs of Series LYROPETALA from the realm of sculpture. Later sections, especially in the Series VILLOSAE are endowed with species whose seeds are ornate indeed. For example the tubercles in *D. villosa* are stellate in outline, those in its subsp. *palustris* are often capitate, those in *D. divaricata* var. *stricta* are secondarily tuberculate. On the other hand, forms of *D. ovata* have smooth and lustrous black seeds. Usually the seeds are reddish-brown, but in *D. viscosa* they are yellow; occasionally seeds of some species in the Series ARENARIOIDES emit a purple substance into the dissection medium. Seeds have turned out to be rather critical indicators of a species' systematic position in *Drymaria*. It should be pointed out however, that in working with *Spergula*, J. K. New (in Ann. Bot. 23:23. 1960) has found variations in the number of papillae on the seed coats to be environmentally induced. Furthermore she has found no genetic correlation between the variations in seed-coats and in hairiness. Species of *Drymaria*, whose seeds are highly viable a year after collection and germinate rapidly in the greenhouse, should prove interesting subjects for similar studies.

#### GEOGRAPHY

Departing somewhat from the "typical" picture of the Caryophyllaceae, *Drymaria* is largely a subtropical genus. Of the forty-eight species herein maintained, all but two are strictly American, and only one subspecies does not occur in America. As a whole in America the genus ranges from the western United States through Central and South America to Argentina and Chile, the large majority of the species occurring on the western halves of the continents. Florida, Surinam and Brazil, on the eastern shore, seem to possess only the pantropical *D. cordata*. For a geographical tabulation of species, the reader is referred to the citation of specimens which terminates this paper.

Of particularly geographical interest is *D. cordata*, whose varietal potential and geographical distribution has been studied in some detail by Mizushima (in Jour. Jap. Bot. 32:69. 1957). Almost all material from continental Asia belongs to the subspecies *diandra* (maintained as a species by Mizushima), a subspecies completely



lacking in America (excl. Hawaii). On the Pacific Islands both subspecies and the rather distinct variety *pacifica* occur and appear to maintain their integrity by and large. In Africa however, there are about as many intermediates as there are pure representatives of the two subspecies.

A second species occurs in Malaysia and, to judge from the literature, has been introduced there only within the present century. Of course there is the more remote possibility that it has merely been overlooked until this century. The species, *D. villosa*, is so distinct that I prefer to believe that it is a recent introduction from the Americas.

Several interesting disjunctions are apparent in the genus. Most striking is that illustrated by *D. ladewii*, known only from two collections in Bolivia, but represented by bountiful material from Guatemala and southern Mexico. More easy of interpretation are several vicarious disjunctions between Baja California and mainland Mexico, e.g. *D. bolosteoides* & *D. pachyphylla*; *D. arenarioides* ssp. *peninsularis* & *D. arenarioides* ssp. *arenarioides*; *D. gracilis* ssp. *carinata* & *D. gracilis* ssp. *gracilis*.

#### ECONOMICS

Often a conspicuous element in the herbaceous vegetation, *Drymaria* probably plays in the subtropics the insignificant role played by the chickweed in temperate North America, fairly well known, but hardly a topic for conversation. *Drymaria cordata*, and perhaps others, which spread radially and root at the nodes forming rather lush mats, have been planted as ground covers. In Ecuador various species are used as curatives for liver and kidney ailments. In Mexico, species are reputedly used to cure "yaza" and in the Orient, infusions are purportedly used to alleviate headaches. One should be careful of the plant, especially as an oral administration. *Drymaria pachyphylla* (and probably related species) is seriously toxic to livestock, and all measures should be taken to prevent its spread in the arid West, where palatable fodder is at a minimum. Fortunately the seeds alone of *D. pachyphylla* are so distinctive (see Fig. 1C) as to separate it from any other species.

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for their suggestions and comments.\* Special thanks are extended to my wife, Peggy, who has been kind enough to prepare the illustrations.

### DRYMARIA Willd.

DRYMARIA Willd. ex Roem. & Schult. Syst. 5:31. 1819.

*Pinosia* Urban, in Arkiv. Bot. 23A<sup>5</sup>:70. pl. 2. 1930.

*Mollugophytum* M. E. Jones, in Extr. Contr. West. Bot. 18:35. 1933.

Annual or perennial, glabrous or pubescent herbs, occasionally subliguous below, prostrate, spreading or erect. Leaves opposite or pseudovercillate, glabrous to villose or glandular, sessile to long-petiolate, usually with persistent or fugaceous small stipules. Flowers few to many in dichasial cymes, rarely in pseudovercils, racemes, or solitary or clustered in the leaf axils. Sepals 5, not connate. Petals (0-) 3-5, white, usually 2-cleft, occasionally appendiculate in the sinus, often auriculate. Stamens 2-5, the anthers versatile, 2-celled, the flattened filaments slightly connate at the base, rarely alternating with prominent staminodia. Ovary superior, slightly stipitate; carpels mostly 3, the 3 styles more or less united below; ovules few to many, campylotropous on free central placentae. Capsule ovoid to spheroid, usually dehiscent into 3 entire valves; seeds 1 to many, cochleate, foetiform, hippocrepiform, or ampulliform, usually tuberculate, the embryo curved about the perisperm.

As here conceived the genus consists of 48 species, all but two of them exclusively American. Since the genus has never been monographed in its entirety, and no supraspecific classification has been elaborated, I would like to propose the following informal series, most of which seem to be rather homogeneous. Following a tabular presentation of the series is an artificial analytic key to all species. Following this is a systematic key to the series. The latter key, although not assuredly phylogenetic, is so set up that species with the more elaborate floral characters, often correlated with certain vegetative factors, come first, and the species with simpler floral construction come later. I am not prepared to say whether evolution in the genus has been a matter of reduction or amplification or both.

### SUPRASPECIFIC CLASSIFICATION

#### A. Series HOLOSTEOIDES

1. *D. holosteoides*
2. *D. pachyphylla*

#### B. Series LYROPETALA

3. *D. elata*
4. *D. subumbellata*
5. *D. suffruticosa*
6. *D. lyropetala*

#### C. Series STIPITATAE

7. *D. stipitata*

#### D. Series ARENARIOIDES

8. *D. molluginea*
9. *D. arenarioides*
10. *D. axillaris*
11. *D. barkleyi*
12. *D. polycarpoides*

#### E. Series VISCOSAE

13. *D. viscosa*

#### F. Series ORTEGIOIDES

14. *D. ortegioides*

\*Dr. F. Raymond Fosberg has kindly reviewed an early draft of this paper and made many valuable suggestions; unfortunately Dr. Fosberg's comments were received as this went to press, and could not be used to full advantage.

## G. Series EXCISAE

15. *D. hypericifolia*  
 16. *D. excisa*  
 17. *D. longepedunculata*

## H. Series LEPTOPHYLLA

18. *D. effusa*  
 19. *D. leptophylla*

## I. Series TENUES

20. *D. anomala*  
 21. *D. tenuis*

## J. Series FRUTESCENTES

22. *D. stellarioides*  
 23. *D. stereophylla*  
 24. *D. auriculipetala*  
 25. *D. frutescens*

## K. Series FASCICULATAE

26. *D. fasciculata*  
 27. *D. engleriana*  
 28. *D. praecox*

## L. Series DEBILES

29. *D. debilis*

## M. Series LAXIFLORES

30. *D. laxiflora*

## N. Series VILLOSAE

31. *D. multiflora*  
 32. *D. conzattii*  
 33. *D. malacbioides*  
 34. *D. villosa*

## O. Series GRANDIFLORES

35. *D. firmula*  
 36. *D. ovata*  
 37. *D. apetala*  
 38. *D. glaberrima*  
 39. *D. monticola*  
 40. *D. grandiflora*  
 41. *D. paposana*  
 42. *D. rotundiflora*

## P. Series DIVARICATAE

43. *D. divaricata*

## Q. Series CORDATAE

44. *D. gracilis*  
 45. *D. glandulosa*  
 46. *D. xerophylla*  
 47. *D. ladewii*  
 48. *D. cordata*

## ARTIFICIAL KEY TO SPECIES AND SUBSPECIFIC TAXA

1. Petals absent or reduced, shorter than the stamens:
  2. Sepals acute:
    3. Plants villose.....34a. *D. villosa* f. *TEPICANA*
    3. Plants not villose:
      4. Sepals 3-4 mm. long; Mexico.....46. *D. xerophylla*
      4. Sepals 7.5-9.0 mm. long; Peru.....37. *D. apetala*
  2. Sepals obtuse.....34b. *D. villosa* f. *TOWNSENDII*
1. Petals present; longer than or as long as the stamens:
  5. Petals laterally lacerate, alternating with clavate staminodia.....7. *D. stipitata*
  5. Petals not laterally lacerate; stamodia not clavate:
    6. Leaves pseudoverticillate; petals often distally lacerate; North America:
      7. Seeds dorsally hispidulous; petals bifid or polylacerate apically.
        8. Inflorescence compact, the bracts subcontiguous:
          9. Sepals 3-5 mm. long.....3. *D. elata*
          9. Sepals 5-6 mm. long.....4. *D. subumbellata*
        8. Inflorescence lax, the bracts remote.
          10. Trunk of the petals nearly as broad as long; plants glabrous.....5. *D. suffruticosa*
          10. Trunk of the petals about twice as long as broad; plants glandular.....6. *D. lyropetala*
      7. Seeds not dorsally hispidulous; petals bifid or polylacerate apically:
        11. Petals apically 3-many-fid.

12. Leaves linear to oblong; seeds not foetiform.
  13. Flowers in cymes, the bracts clearly different from the foliage leaves.....8. *D. MOLLUGINEA*
  13. Flowers more or less racemose, the bracts little different from the foliage leaves.
    14. Plants not glandular; petals trifold and bifid.....11. *D. BARKLEYI*
    14. Plants glandular; petals 4-6-fid:
      15. Sepals and petals 4-7 mm. long.....9a. *D. ARENARIOIDES* ssp. *ARENARIOIDES*
      15. Sepals and petals 2.8-4.0 mm. long; Baja California.....9b. *D. ARENARIOIDES* ssp. *PENINSULARIS*
12. Leaves more or less elliptic, glaucous; seeds foetiform:
  16. Petals with 5-10 lobes; sepals 3-5 mm. long; Baja California.
    17. Nodes mostly more than 4 cm. apart, often branching.....1a. *D. HOLOSTEOIDES* var. *HOLOSTEOIDES*
    17. Nodes mostly less than 4 cm. apart, rarely branching.....1b. *D. HOLOSTEOIDES* var. *CRASSIFOLIA*
  16. Petals mostly with 4 lobes; sepals 2.0-3.5 mm. long; Continental North America.....2. *D. PACHYPHYLLA*
11. Petals merely bifid.
  18. Sepals obtuse, not strongly 3-ribbed; flowers racemose or cymose.
    19. Sepals stipitate-glandular; Baja California.
      20. Seeds yellow, smooth.....13. *D. VISCOSA*
      20. Seeds brown, tuberculate or granular.....9b. *D. ARENARIOIDES* ssp. *PENINSULARIS*
    19. Sepals without stipitate glands; continental North America:
      21. Leaves linear.....8. *D. MOLLUGINEA*
      21. Leaves elliptic.....11. *D. BARKLEYI*
  18. Sepals acute or strongly 3-ribbed, if obtuse, the flowers in cymes.
    22. Sepals obtuse (*D. effusa*):
      23. Bracts mostly shorter than the pedicels:
        24. Axes of the inflorescence stipitate-glandular.....18a. *D. EFFUSA* var. *EFFUSA*
        24. Axes of the inflorescence not stipitate-glandular.....18b. *D. EFFUSA* var. *CONFUSA*
      23. Bracts mostly longer than the pedicels; plants minute.....18c. *D. EFFUSA* var. *DEPRESSA*
    22. Some or all the sepals in a flower acute to acuminate (*D. leptophylla*):
      25. Peduncles not stipitate-glandular; pedicels shorter than the bracts.....19a. *D. LEPTOPHYLLA* var. *LEPTOPHYLLA*
      25. Peduncles stipitate-glandular; pedicels (ultimately) longer than the bracts.
        26. Sepals lanceolate, not stipitate-glandular...19b. *D. LEPTOPHYLLA* var. *COGNATA*
        26. Sepals ovate, stipitate-glandular.....19c. *D. LEPTOPHYLLA* var. *NOODOSA*
6. Leaves opposite; petals bifid, the lobes themselves sometimes dichotomizing; North and South America, 2 spp. more or less pantropical.
  27. Petals 2-many-times dichotomous; Mexico; West Indies:
    28. Leaves elliptic; Cuba.....14. *D. ORTEGIOIDES*
    28. Leaves ovate to reniform; Mexico:
      29. Plants villose; petals 1-2 times dichotomous.....17. *D. LONGEPEDUNCULATA*
      29. Plants not villose; petals 2-4 times dichotomous:
        30. Leaves deltoid-ovate, rather narrow.....15. *D. HYPERICIFOLIA*
        30. Leaves suborbicular to obreniform.....16. *D. EXCHISA*
  27. Petals merely bifid, the lobes occasionally emarginate.
    31. Leaves linear to elliptic: (cf. also *D. polycarpoides*, *D. axillaris*.)
      32. Plants rarely suffruticose; North America.
        33. Leaves linear to spatulate; petioles obsolete:
          34. Sepals all obtuse, often cucullate (*D. effusa*):
            35. Plants more than 5 cm. tall; many of the pedicels longer than the bracts.

36. Peduncles and pedicels stipitate-glandular.....18a. *D. EFFUSA* var. *EFFUSA*  
 36. Peduncles and pedicels not stipitate-glandular.....  
 .....18b. *D. EFFUSA* var. *CONFUSA*  
 35. Plants mostly less than 5 cm. tall; bracts mostly longer than the  
 pedicels.....18c. *D. EFFUSA* var. *DEPRESSA*  
 34. Some or all of the sepals acute or acuminate (*D. leptophylla*).  
 37. Peduncles not stipitate-glandular; pedicels mostly shorter than the  
 bracts.....19a. *D. LEPTOPHYLLA* var. *LEPTOPHYLLA*  
 37. Peduncles stipitate-glandular; pedicels often elongate.  
 38. Sepals lanceolate, not stipitate-glandular.....  
 .....19b. *D. LEPTOPHYLLA* var. *COGNATA*  
 38. Sepals ovate, stipitate-glandular.....19c. *D. LEPTOPHYLLA* var. *NODOSA*  
 33. Leaves lanceolate, the petioles obvious:  
 39. Sepals 3-ribbed.....20. *D. ANOMALA*  
 39. Sepals 1-ribbed.....21. *D. TENUIS*  
 32. Plants suffrutescent; Peru and Ecuador:  
 40. Leaves neither imbricate nor pungent.  
 41. Sepals usually glandular, the midrib not excurrent.  
 42. Leaves subpergameneous, stipitate; Ecuador.....22. *D. STELLARIOIDES*  
 42. Leaves membranaceous, often estipulate; Peru.....23. *D. STEREOPHYLLA*  
 41. Sepals glabrous, the midrib excurrent.....24. *D. AURICULIPETALA*  
 40. Leaves imbricate, pungent.....25. *D. FRUTESCENS*  
 31. Leaves narrowly ovate to reniform.  
 43. Petals exunguiculate, the broad trunk not narrowed to a claw, the trunk  
 about as wide as the combined widths of the lobes.  
 44. Petal-lobes emarginate.....30. *D. LAXIFLORA*  
 44. Petal-lobes acute to emarginate.  
 45. Cyanic glaucous perennials of the Coahuilan Desert.  
 46. Flowers axillary, the sepals stipitate-glandular.....10. *D. AXILLARIS*  
 46. Flowers cymose, the sepals glabrous.....12. *D. POLYCARPOIDES*  
 45. Verdant annuals or perennials of South America.  
 47. Sepals more than 4.5 mm. long, or the bracts not stipulate..  
 48. Inflorescences mostly axillary, lax, the pedicels obvious.....38. *D. GLABERRIMA*  
 48. Inflorescences terminal, dense, the pedicels obscured.....26. *D. FASCICULATA*  
 47. Sepals less than 4.5 mm. long, the bracts often stipulate.  
 49. Sepals acute, stipitate-glandular:  
 50. Pedicels mostly longer than the bracts.....28. *D. PRAECOX*  
 50. Pedicels mostly shorter than the bracts.....  
 .....27a. *D. ENGLERIANA* var. *ENGLERIANA*  
 49. Sepals acuminate, glabrous.....27b. *D. ENGLERIANA* var. *DEVIA*  
 43. Petals with a definite claw, the two lobes basally tapered or truncate to  
 the claw:  
 51. Petals with ciliate auricles near the summit of the claw; seeds with sub-  
 stellate or capitate or cylindric tubercles:  
 52. Leaves broadest at or above the middle, the stipules entire, lanceolate;  
 sepals subdeltoid, widest quite near the base.....31. *D. MULTIFLORA*  
 52. Leaves broadest below the middle, the stipules if entire, filiform or  
 acicular; sepals oblong to orbicular; widest well above the base.  
 53. Sepals 4.5 mm. long or longer; leaves cordate, often broader than  
 1.5 cm.  
 54. Stipules longer than the petioles.....32. *D. CONZATTI*  
 54. Stipules shorter than the petioles.....33. *D. MALACHIOIDES*  
 53. Sepals mostly less than 4.5 mm. long; leaves if rarely cordate, mostly  
 less than 1.5 cm. broad:  
 55. Plants villose; mostly clambering annuals.  
 56. Sepals elliptic, acute; tubercles of the seeds stellate.....  
 .....34a. *D. VILLOSA* ssp. *VILLOSA*



56. Sepals oblong to orbicular, obtuse; tubercles of the seeds stellate, capitate, cylindric or simple.
57. Seeds with ornate tubercles; petal lobes not deeply emarginate; sepals usually glabrous.....34b. *D. VILLOSA* ssp. *PALUSTRIS*
57. Seeds with simple tubercles; petal lobes deeply emarginate; sepals villosulous.....17. *D. LONGEPEDUNCULATA*
55. Plants glabrous, the leaves occasionally villose but glabrescent; plants sprawling annuals or erect perennials.....34b. *D. VILLOSA* ssp. *PALUSTRIS*
51. Petals without ciliate auricles; seeds with simple or ornate tubercles, rarely etuberculate:
58. Plants villose:
59. Seeds ampulliform; stamens of two sizes; Baja California.....29. *D. DEBILIS*
59. Seeds cochleate; stamens more or less equal:
60. Seeds with ornate tubercles; sepals no more than 4.5 mm. long:
61. Sepals glabrous, obtuse.....34b. *D. VILLOSA* ssp. *PALUSTRIS*
61. Sepals villose or villosulous, obtuse or acute.
62. Sepals obtuse; Venezuela and Colombia.....34c. *D. VILLOSA* ssp. *PARAMORUM*
62. Sepals acute; Peru.....28. *D. PRAECOX*
60. Seeds smooth or the tubercles not ornate; sepals 4-10 mm. long:
63. Petals bifid about  $\frac{1}{4}$  their length, the lobes broad, 7-11-nerved; Peru.....40. *D. GRANDIFLORA*
63. Petals bifid about  $\frac{1}{2}$  their length, the lobes narrow, 3-7-nerved; Andean South America.....36. *D. OVATA*
58. Plants not villose:
64. Petals equaling or shorter than the sepals, the lobes mostly 1-nerved; stamens often fewer than five:
65. Petals about equaling the sepals in length:
66. Sepals 3-nerved, not carinate; tubercles ornate.
67. Sepals oblong to orbicular, obtuse, the petals often with ciliate auricles; tubercles of the seeds stellate or capitate.....34b. *D. VILLOSA* ssp. *PALUSTRIS*
67. Sepals elliptic, acute, the petals scarcely auriculate; tubercles of the seeds domical or conical, secondarily tuberculate.....43b. *D. DIVARICATA* var. *STRICTA*
66. Sepals 1-nerved, carinate; tubercles not ornate (*D. gracilis*).
68. Stipules lacerate; continental Mexico and Central America.....44a. *D. GRACILIS* ssp. *GRACILIS*
68. Stipules entire; Baja California.....44b. *D. GRACILIS* ssp. *CARINATA*
65. Petals shorter than the sepals.
69. Flowers clustered in axils of subsessile leaves, the inflorescence, if rarely proliferating, with supernumerary bracts.....46. *D. XEROPHYLLA*
69. Flowers in lax terminal and axillary cymes, if rarely solitary, the leaves obviously petiolate.
70. Leaves more or less deltoid, trinerved, with the secondary veins forming an interrupted, slightly raised, reticulum, very thin; stipules entire; Chiapas, Guatemala; Bolivia.....47. *D. LADEWII*
70. Leaves ovate to reniform or cordate, not obviously trinerved or reticulate; stipules lacerate:
71. Seeds 0.6-0.8 mm. long, the tubercles rectanguloid, remote; plants often erect and perennial.....45a. *D. GLANDULOSA* var. *GLANDULOSA*
71. Seeds 0.8-2.0 mm. broad, the tubercles domical, contiguous; plants annual and usually prostrate:
72. Flowers broadest at or below the middle, the sepals not inflexed; seeds 0.8-1.3 mm. broad.....48a. *D. CORDATA* ssp. *CORDATA*
72. Flowers broadest above the middle, the sepals usually incurved; seeds 1.3-2.0 mm. broad.....48b. *D. CORDATA* ssp. *DIANDRA*

64. Petals equaling or exceeding the sepals, the lobes with dendritic or flabellate venation; stamens mostly five:
73. Sepals obtuse, often cucullate; South America:
74. Flowers in lax axillary cymes; plants glabrous:
75. Petals subexunguiculate; Peru.....38. *D. GLABERRIMA*
75. Petals tapered to a long definite claw; Galapagos Islands.....39. *D. MONTICOLA*
74. Flowers in dense to lax, mostly terminal, cymes:
76. Sepals glandular or villosulous:
77. Sepals carinate, the inflorescences capitate:
78. Petals clearly exerted, the lobes truncate to the claw; Peru.....41b. *D. PAPOSANA* var. *WEBERBAUERI*
78. Petals little if at all exerted, the lobes tapered to the claw; northern Chile.....41a. *D. PAPOSANA* var. *PAPOSANA*
77. Sepals not or rarely carinate, the inflorescences lax.....40. *D. GRANDIFLORA*
76. Sepals glabrous or with scanty sessile glands:
79. Sepals ellipsoid to orbicular, quite obtuse, often with sessile glands.....42a. *D. ROTUNDIFOLIA* var. *ROTUNDIFOLIA*
79. Sepals narrowly to broadly ovate, acutish, glabrous.....42b. *D. ROTUNDIFOLIA* var. *NITIDA*
73. Sepals acute; North and South America:
80. Seeds lustrous, often smooth; leaves often pergameneous:
81. Stipules as long as the petioles; seeds tuberculate; Venezuela.....35. *D. FIRMULA*
81. Petioles equaling to much longer than the stipules; seeds corrugated or smooth; Colombia to Argentina along the Andes.....36. *D. OVATA*
80. Seeds dull, tuberculate; leaves membranaceous:
82. Seeds with low remote tubercles; Mexico.....45b. *D. GLANDULOSA* var. *GALEOTTIANA*
82. Seeds with prominent, often contiguous, tubercles; South America:
83. Sepals carinate, the carinae often serrulate
84. Inflorescence capitate, the petal lobes truncate to the claw.....41b. *D. PAPOSANA* var. *WEBERBAUERI*
84. Inflorescence lax, the petal lobes tapered to the claw.....41c. *D. PAPOSANA* var. *SERRULATA*
83. Sepals rarely carinate, the carina not serrulate:
85. Inflorescence capitate, the petal lobes truncate to the claw.....41b. *D. PAPOSANA* var. *WEBERBAUERI*
85. Inflorescence not capitate, the petal lobes tapered to the claw but often auriculate:
86. Petals and sepals about equal in length:
87. Petals auriculate:
88. Sepals weakly nerved, basally saccate:
89. Leaves long-petiolate; tubercles of the seeds mammiliform.....43a. *D. DIVARICATA* var. *DIVARICATA*
89. Leaves short-petiolate; tubercles of the seeds secondarily tuberculate.....43b. *D. DIVARICATA* var. *STRICTA*
88. Sepals strongly nerved, not basally saccate:
90. Leaves elliptic to ovate, short-petiolate.....43c. *D. DIVARICATA* var. *REFLEXIFLORA*
90. Leaves, at least some on a given plant, reniform, long-petiolate:
91. Sepals and herbage densely viscid-glandular; flowers at anthesis ca. twice as long as broad,

- rather square in cross section, alpine plant.....  
 .....44c. *D. DIVARICATA* var. *VISCIDULA*
91. Sepals and herbage subglabrous to villous; flowers at anthesis broader, terete; loma plants.  
 .....43d. *D. DIVARICATA* var. *DIVERGENS*
87. Petals exauriculate:
92. Minute plants, the pedicels about as long as the bracts; tubercles of the seeds simple.....28. *D. PRAECOX*
92. Large plants, the pedicels much longer than the bracts; tubercles of the seeds secondarily tuberculate.....43b. *D. DIVARICATA* var. *STRICTA*
86. Petals much longer than the sepals:
93. Petals exauriculate:
94. Seeds lustrous.....36. *D. OVATA*
94. Seeds not lustrous:
95. Plants glabrous:
96. Leaves long-petiolate; sepals basally saccate.....  
 .....43a. *D. DIVARICATA* var. *DIVARICATA*
96. Leaves subsessile; sepals not saccate:
97. Sepals strongly nerved, carinate; leaves often crenulate.....  
 .....41c. *D. PAPOSANA* var. *SERRULATA*
97. Sepals weakly nerved, ecarinate; leaves entire.....42b. *D. ROTUNDIFOLIA* var. *NITIDA*
95. Plants villose or villous.....40. *D. GRANDIFLORA*
93. Petals auriculate.
98. Plants not villose or villous:
99. Leaves subsessile, often crenulate.....  
 .....41c. *D. PAPOSANA* var. *SERRULATA*
99. Leaves long-petiolate, entire.....  
 .....43a. *D. DIVARICATA* var. *DIVARICATA*
98. Plants villose or villous.
100. Leaves sessile or subsessile.....40. *D. GRANDIFLORA*
100. Leaves long-petiolate.....  
 .....43a. *D. DIVARICATA* var. *DIVARICATA*

## KEY TO THE SERIES OF DRYMARIA

- a. Leaves estipulate, pseudoverticillate, as the flowers; petals with 4-10 distal lobes; seeds foetiform or hippocrepiform, not dorsally hispid.....Series A: *HOLOSTEIOIDES* (p. 186)
- a. Leaves, if pseudoverticillate, stipulate; seeds, if foetiform, dorsally hispid:
- b. Leaves linear; plants upright perennials; petals with many distal lobes; seeds foetiform, dorsally hispid.....Series B: *LYROPETALA* (p. 189)
- b. Leaves linear to reniform; plants annual or perennial; petals entire to multilobate; seeds, if rarely foetiform, not dorsally hispid:
- c. Leaves elliptic, opposite, estipulate; petals apically and laterally polyclavate, alternating with conspicuous clavate staminodia.....Series C: *STIPITATAE* (p. 193)
- c. Leaves and petals various; staminodia neither conspicuous nor clavate:
- d. Petals distally 3-8-lobed, or bifid, if merely bifid, the trunk much longer than the claw, laterally denticulate; seeds smooth to granular; North America.....  
 .....Series D: *ARENARIOIDES* (p. 193)
- d. Petals merely bifid, or equally quadrid, the lobes sometimes emarginate or dichotomizing; seeds tuberculate (ex. *D. viscosa* and *D. ovata*):
- e. Leaves linear, pseudoverticillate or rarely opposite, viscid; seeds smooth; dorsally brown, facially transparent, revealing the yellowish embryo. Baja California.....  
 .....Series E: *VISCOSAE* (p. 200)
- e. Leaves linear to reniform; opposite, glabrous to villose or glandular; seeds tuberculate (except *D. ovata* var.) reddish brown to black.

- f. Petals with four equal lobes or with two dichotomizing lobes. Cuba and Mexico.
- g. Stamens and petals three, the petals with four equal lobes; bracts more or less imbricate. Cuba.....Series F: ORTEGIOIDES (p. 200)
- g. Stamens and petals five, the petals bifid, the lobes dichotomizing; bracts remote. Mexico.....Series G: EXCISAE (p. 201)
- f. Petals merely bifid, the lobes rarely emarginate:
- h. Leaves linear to lance-elliptic (ovate in *D. fasciculata*), stipulate or estipulate, petals exauriculate, often exunguiculate; seeds without ornate tubercles.
- i. Petals unguiculate; delicate caespitose or erect virgate annuals, rarely spreading and perennial. North America:
- j. Leaves linear to oblong or spatulate, the petioles obsolete; plants not laxly spreading.....Series H: LEPTOPHYLLA (p. 204)
- j. Leaves lanceolate to elliptic, the petioles evident; plants laxly spreading.....Series I: TENUES (p. 210)
- i. Petals exunguiculate or subexunguiculate; suffrutescent erect perennials or delicate annuals. Peru and Ecuador.
- k. Large-flowered suffrutescent perennials, the leaves occasionally estipulate; flowers occasionally dimorphic.....Series J: FRUTESCENTES (p. 212)
- k. Small-flowered delicate annuals (exc. *D. fasciculata* which may tend to become large-flowered and suffruticose); leaves stipulate; flowers monomorphic.....Series K: FASCICULATAE (p. 216)
- h. Leaves ovate to reniform, stipulate; petals (rarely absent) unguiculate, often auriculate; seeds occasionally with ornate tubercles, rarely smooth and lustrous.
- l. Villose plants with long-petiolate leaves; petals simply bifid, exceeding the sepals; stamens 5, all fertile, unequal. Baja California.....Series L: DEBILES (p. 220)
- l. Glabrous to villose plants with sessile to long-petiolate leaves; petals bifid, the lobes sometimes emarginate or auriculate; stamens 2-5, if unequal, the inequality usually due to sterilization.
- m. Trunk of the petals longer than the claw, the lobes deeply emarginate, exauriculate. Western U. S. to Central America.....Series M: LAXIFLORES (p. 222)
- m. Trunk of the petals shorter than the claw (except *D. glaberrima*), the lobes acute to emarginate, occasionally basally auriculate:
- n. Lobes of the petals mostly with more than one vein, often basally dentate or auriculate, the auricles often ciliate; petals (except in apetalous forms) equaling or exceeding the sepals; seeds usually numerous, with coarse ornate tubercles, or the tubercles simple (absent in *D. ovata*); stamens 5 with oblong anthers, the styles mostly three, joined half their length or more; plants often villose with jointed hairs:
- o. Petals basally provided with ciliate auricles (except in forms of *D. villosa* with obtuse often cucullate sepals); tubercles of the seeds stellate, cylindric or capitate; North and South America; introduced in Malaysia.....Series N: VILLOSAE (p. 223)
- o. Petals exauriculate or the auricles not ciliate; tubercles of the seeds domical, conical, or rarely secondarily tuberculate; western South America:
- p. Inflorescences often subcapitate, the pedicels if longer than the flowers not divaricate; sepals often obtuse, not basally saccate; often carinate; petals often with no trace of an auricle; leaves often sessile, occasionally crenulate, pergamenous, a/o densely villose; Colombia to Argentina.....Series O: GRANDIFLORES (p. 230)
- p. Inflorescences lax, the pedicels elongate and divaricate; sepals acute or basally saccate, not carinate; petals with minute deltoid or mammiliform auricles; leaves short- to long-petiolate, entire, membranaceous, not densely villose.....Series P: DIVARICATAE (p. 240)
- n. Lobes of the petals 1-nerved (except *D. glandulosa* var. *galeottiana*), exauriculate, the petals mostly shorter than the sepals (except in *D. gracilis* which occasionally has deltoid auricles); seeds 1-many, tuberculate, the tubercles low and domical or rectanguloid, contigu-

ous or remote; stamens and styles often reduced to 2, the anthers then tending to be orbicular, and the styles free nearly to their base; plants not villose.....Series Q: CORDATAE (p. 245)

#### A. Series HOLOSTEOIDES

Leaves elliptic, pseudovercillate, estipulate, often somewhat glaucous and succulent. Flowers in pseudovercills. Sepals obtuse, often somewhat cucullate, the venation subdendritic. Seeds foetiform or hippocrepiform, merely granular, occasionally gibbose and umbonate. Two halophytic species of western United States and Mexico, both probably toxic to cattle. Fig. 1.

- a. Sepals 3-5 mm. long; petals 5-10-lobed; seeds 0.6-1.0 mm. long, about as broad as long; herbage glaucous, glabrous or glandular; Baja California:
  - b. Leaves and stems often stipitate-glandular; many, if not all, the internodes longer than 4 cm., with branching at most of the nodes; petals 2.8-3.5 mm. long, often equaling or exceeding the sepals; seeds often strongly umbonate and gibbose.....1a. D. HOLOSTEOIDES var. HOLOSTEOIDES
  - b. Leaves and stems glaucous, rarely stipitate-glandular, often tinted with anthocyanins; most of the internodes shorter than 4 cm., with branching at few of the nodes; petals 2.0-3.5 mm. long, the sepals usually longer; seeds rarely gibbose.....1b. D. HOLOSTEOIDES var. CRASSIFOLIA
- a. Sepals 2.0-3.5 mm. long; petals 4-lobed; seeds 1.0-1.8 mm. long, about twice as long as broad; herbage glabrous; continental Mexico and adjacent United States.....2. D. PACHYPHYLLA

#### 1a. DRYMARIA HOLOSTEOIDES var. HOLOSTEOIDES

*Drymaria holosteoides* Benth. Bot. Voy. Sulph. 16. 1844. (HOLOTYPE: *Hinds s. n.* in 1841 at Magdalena Bay; K!; isotypes at GH & LE.)

*Drymaria veatchii* Curran, in Proc. Cal. Acad. 21:227. 1888. (HOLOTYPE: Veatch in 1888 on Cedros Island, UCI)

*Mollugophytum holosteoides* M. E. Jones, Extr. Contr. West. Bot. 18:35. 1933.

Radially spreading herbaceous to lignescent annuals to as much as 40 cm. long, branching at nearly every node, stipitate-glandular to glabrescent, the internodes mostly much longer than the leaves, with a caducous rosette of spatulate leaves. Cauline leaves pseudovercillate, the blades glabrous or scantily glandular, occasionally somewhat glaucous, narrowly to broadly elliptic, apically rounded or acutish, basally acute, 4-12 mm. long, 2-7 mm. broad, the petioles glabrous to stipitate glandular, 2-8 mm. long; stipules absent. Inflorescences of terminal and axillary contracted umbelloid cymes, subtended by both normal foliage leaves and scarious ovate bracts 1-2 mm. long; pedicels 2-6 mm. long, glandular or stipitate-glandular. Sepals 5, glandular or stipitate-glandular, broadly oblong, obovate or suborbicular, apically obtuse and often cucullate, 3-4 mm. long, 1.6-3.0 mm. broad, the venation obscure, dendritic; petals 5, 2.8-3.5 mm. long, bifid for about half their length, with 4-6 laciniae in the cleft, these about half as long as the oblong lobes, the trunk suborbicular, denticulate or crenulate, cordate or truncate to the minute claw; stamens 5, ca. 3 mm. long, the oblong anthers ca. 0.6 mm. long; ovary at anthesis globose, the styles attaining the anthers, bifid or trifid less than a third of its length. Capsule subglobose, 1.5-3.0 mm. long, 6-20-seeded, the seeds foetiform, basally umbonate, laterally gibbose and often dorsally flanged, granular, 0.5-



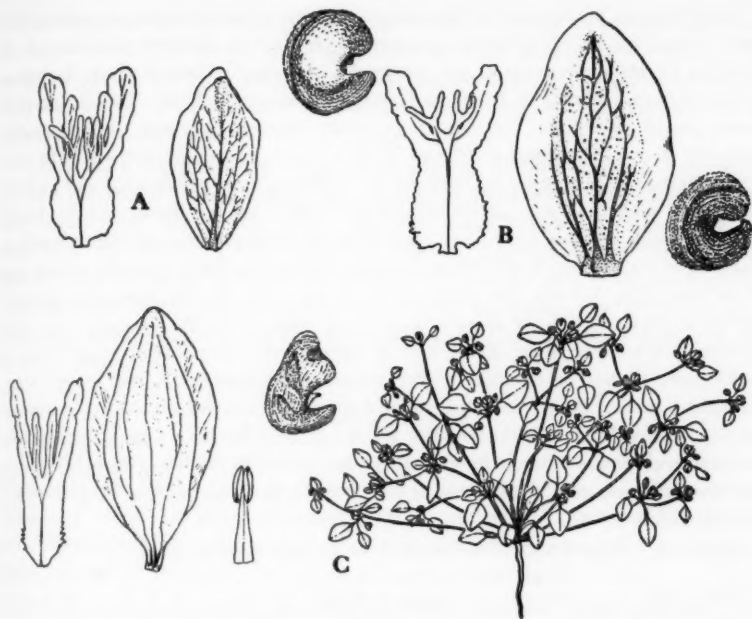


Fig. 1: A. *D. holosteoides* var. *holosteoides* (holotype of *D. veatchii*); petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed  $15\times$ . B. *D. holosteoides* var. *crassifolia* (holotype); petal,  $10\times$ ; sepal,  $10\times$ ; seed,  $15\times$ . C. *D. pachyphylla* (holotype) petal,  $10\times$ ; sepal,  $10\times$ ; stamen,  $10\times$ ; seed,  $10\times$ ; habit,  $\frac{1}{2}\times$ .

1.0 mm. long, nearly or quite as broad as long. Fig. 1A (Holotype of *D. veatchii*).

Sandy soils of Baja California, Mexico, mostly north of Cape San Lucas.

The isotype at Leningrad has unusually long styles to 2 mm. long which are divided less than one-third their length, a character more frequent in the var. *crassifolia*. Indeed the type is in some other respects (as well as aspect) intermediate between these closely related varieties but by far the majority of its characteristics are those of the more northern populations. Among other intermediate specimens which forced me to reduce the following species to a variety may be cited *Constance* 3185, which in its strongly gibbose seeds and stipitate-glandular stems approaches the typical variety. However the specimen seems to possess more characteristics of var. *crassifolia*, e. g. the petals are much shorter than the sepals, the internodes are relatively short and the plant is obviously a perennial.

1b. *DRYMARIA HOLOSTEOIDES* var. *crassifolia* (Benth.) J. Duke comb. & stat. nov.

*Drymaria crassifolia* Benth. Bot. Voy. Sulph. 16. 1844. (HOLOTYPE: *Hinds* s. n. in 1841; Cape San Lucas; K 1; isotypes at GH, LE !)

*Mollugophytum crassifolium* M. E. Jones, Extr. Contr. West. Bot. 18:35. 1933.

Subscapitose herbaceous to lignescent perennials verticillately branching but rarely branching at every node, glabrous or very rarely stipitate-glandular, to as much as 20 cm. long, some of the internodes occasionally shorter than the leaves, with a caducous rosette of spatulate leaves, the taproot to 8 mm. broad. Cauline leaves pseudoverticillate, the blades glabrous, carinose, glaucous, often cyanic, narrowly to broadly elliptic, 4–12 mm. long, 3–8 mm. broad, the petioles 4–12 mm. long, glabrous or glandular; stipules absent. Inflorescences of terminal and axillary contracted umbelloid verticils subtended by normal foliage leaves and by bracts 1–2 mm. long; pedicels 5–12 mm. long, glabrous to stipitate-glandular. Sepals 5, glabrous to scantily sessile-glandular, broadly oblong to elliptic, apically obtuse and often cucullate, 3.0–4.5 mm. long, 1.5–2.5 mm. broad, the venation obscure, dendritic; petals 5, 2.0–3.5 mm. long, bifid for about half their length, with 4–6 laciniae in the cleft, these about half as long as the main lobes; trunks ovate, denticulate, cordate or truncate to the minute claw; stamens 5, ca. 3 mm. long, the oblong anthers ca. 0.6 mm. long; ovary at anthesis subglobose, the styles attaining the anthers, bifid or trifid less than a third of their length. Capsule subglobose to ovoid or ellipsoid, 3–5 mm. long, 7–20-seeded, the seeds hippocrepiform, granular, scarcely umbonate or gibbose, 0.8–1.0 mm. broad, nearly or quite as long as broad. Fig. 1B. (Holotype).

Saline soils around Cape San Lucas, Baja California, Mexico.

2. *DRYMARIA PACHYPHYLLA* Wooton & Standl. in Contr. U. S. Nat. Herb. 16: 121. 1913. (HOLOTYPE: *Wooton 405*, dry plains south of the White Sands, N. Mex., US; isotypes at F, GH, MO, UC, etc.!)

Glaucous subsucculent annuals, the vegetative branching largely confined to radially diverging branches from a slender yellowish rootstock or to terminal pseudoverticillate branch systems, the elongate spreading internodes much exceeding the terminally crowded leaves. Leaves pseudoverticillate, glaucous, subsucculent, wrinkling in drying, broadly elliptic to suborbicular, apically obtuse or acutish, basally tapering to the petiole, 4–14 mm. long, 4–12 mm. broad, the glabrous petioles 4–8 mm. long; stipules absent, the petioles clasping. Inflorescences of terminal and axillary contracted umbelloid verticils subtended by normal foliage leaves and bracts 0.5–1.5 mm. long, the pedicels 1–5 mm. long, the bracts ovate, obtuse, scarious and almost nerveless. Sepals 5, subequal, glabrous, glaucous, ellipsoid, obtuse, 2.5–3.3 mm. long, 1.5–2.0 mm. broad, obscurely 3–5-nerved, the central portion green, the margins scarious; petals 5, 2.5–3.0 mm. long, bifid about half their length, with 2 oblong laciniae in the cleft, the trunk serrulate, tapered to the base, the claw not clearly delineated; stamens 5, 1.0–1.5 mm. long, the oblong anthers ca. 0.5 mm. long; ovary at anthesis subglobose, the short style bifid or trifid more than half its length, slightly exceeding the anthers. Capsule subglobose, 3–4 mm. long, mostly exceeding the sepals, 15–25-seeded, the seeds vermiculiform, facially gibbose, more or less tessellate, 0.8–1.8 mm. long, ca. twice as long as broad. Fig. 1C (Holotype).

Heavy saline soils in denudated or ruderal sites, often as a pioneer on bare areas, western U. S. A. and northern Mexico.

Although certain authorities have regarded this species as synonymous with *D. holosteoides*, there seems to be no justification for such a conclusion, as the mainland species differs constantly in many respects from the preceding species of Baja California. The seed alone would suffice to distinguish this species from all other species of *Drymaria*.

Little (in Ecology 18:416. 1937), who regards *D. pachyphylla* as a synonym of *D. holosteoides*, presents some very interesting information about the ecology and toxicity of this serious weed. All the aerial portions of the plant are toxic to cattle and sheep. To complicate matters, the xeromorphic nature of the leaves is responsible for a degree of resistance to drought and to chemical sprays. Campbell (in Journ. Agr. Res. 43:1027. 1931) has shown the species to be a pioneer in plant succession on clay soils such as the adobe soils of portions of our western ranges.

#### B. Series LYROPETALAE

Leaves linear, pseudoverticillate, estipulate or with entire caducous stipules. Flowers in pseudoverticils or in cymes. Sepals obtuse or acute, the venation subdendritic. Petals apically 6-14-lobed, laterally denticulate, minutely unguiculate. Seeds hippocrepiform or foetiform, dorsally hispidulous, etuberculate. Four gypsumphytic species of the Coahuilan Desert of northeastern Mexico. Fig. 2.

- a. Inflorescence pseudoverticillate, compact, the bracts mostly contiguous; petals mostly 6-8-lobed, the lobes lance-deltoid, attenuate, about half as long as the trunk, the trunk occasionally biliguate; staminodia ligular or obsolescent; stylopodium obsolescent; leaves 10-70 mm. long, without true stipules (suppressed branches or leaves *inside* the leaf bases may be confused with stipules):
    - b. Sepals 3.0-4.5 mm. long, often glandular; petals 2.5-3.5 mm. long; stamens 2-3 mm. long, the ligular staminodia 0.2-0.5 mm. long, 0.5-0.8 mm. broad; bracts 0.5-1.5 mm. long.....3. *D. ELATA*
    - b. Sepals 5-6 mm. long, glabrous or bullate; petals 4.5-6.0 mm. long; stamens 3-5 mm. long, the staminodia obsolete or absent; bracts 2.5-4.0 mm. long.....4. *D. SUBUMBELLATA*
  - a. Inflorescence cymose, lax, the bracts remote; petals 10-14-lobed, the lobes linear, obtuse, the outer nearly or quite as long as the trunk, the trunk elinguate; staminodia cupular; stylopodium conspicuous in submature capsules; leaves 3-30 mm. long, with minute caducous stipules:
    - c. Hairs on the seeds dense, erect, 0.3-0.5 mm. long; trunk of the petals nearly as broad as long, basally tapered to the claw, the apical laciniae subequal in length; leaves 6-30 mm. long; bracts 3-5 mm. long; plants glabrous.....5. *D. SUFFRUTICOSA*
    - c. Hairs on the seeds scanty, semi-appressed, 0.2-0.3 (-0.5) mm. long; trunk of the petal nearly twice as long as broad, basally cordate or truncate, the apical laciniae strongly dissimilar; bracts 0.5-3.5 mm. long; plants glandular.....6. *D. LYROPETALA*
3. *DRYMARIA ELATA* I. M. Johnston, in Jour. Arn. Arb. 21:68. 1940. (HOLOTYPE: I. M. Johnston 7823; 10 km. s. of Laguna del Rey, locally abundant in gypsum silt; Coahuila. GH!)

Upright lignescens perennials, the branches opposite or pseudoverticillate, glabrous or glaucous to stipitate-glandular, the internodes mostly longer than the leaves, the tap root to 1 cm. thick. Leaves opposite or pseudoverticillate, glabrous or glaucescent, succulent, obscurely veined, linear, apically obtuse, 1-7 cm. long, 0.5-1.5 mm. broad. Inflorescences of terminal contracted 5-13-flowered umbelloid cymes, the peduncles mostly 5-8 cm. long, glabrous; bracts 0.5-1.0 mm. long,

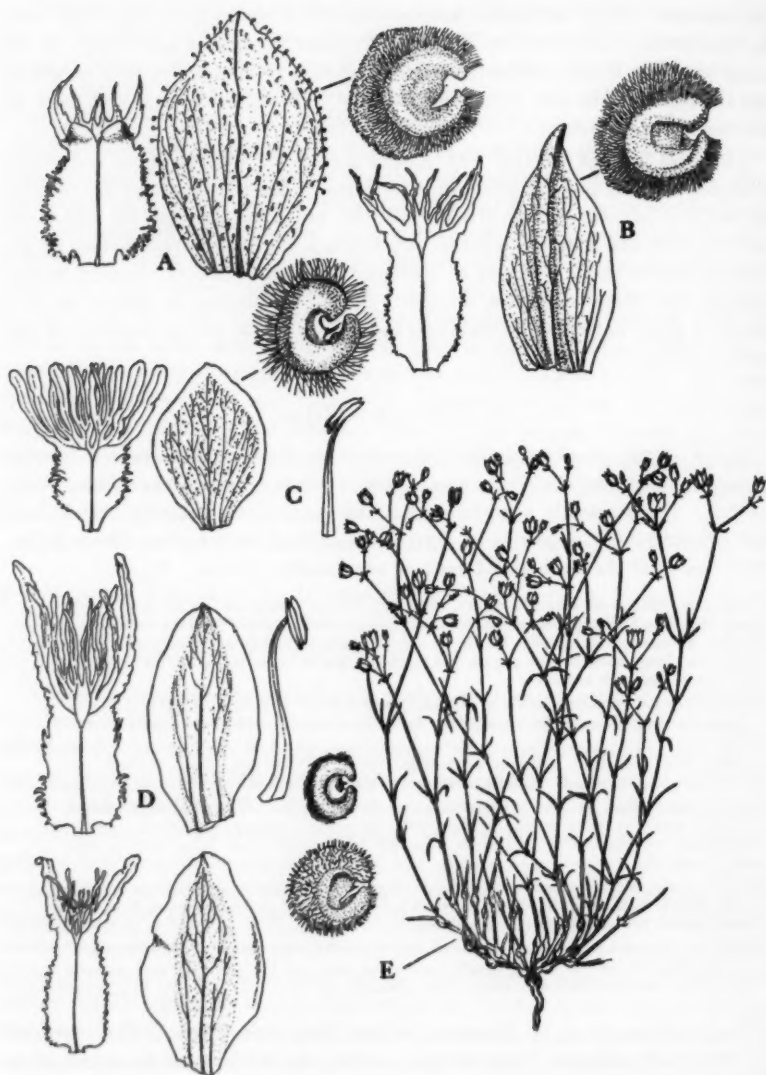


Fig. 2: A. *D. elata* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed 15 $\times$ . B. *D. subumbellata* (holotype); petal, 6 $\times$ ; sepal, 6 $\times$ ; seed, 15 $\times$ . C. *D. suffruticosa* (holotype); petal, 5 $\times$ ; sepal, 5 $\times$ ; stamen, 5 $\times$ ; seed, 15 $\times$ . D. *D. lyropetala* var. *lyropetala* (holotype); petal, 7 $\frac{1}{2}$  $\times$ ; sepal, 7 $\frac{1}{2}$  $\times$ ; stamen, 7 $\frac{1}{2}$  $\times$ ; seed, 10 $\times$ . E. *D. lyropetala* var. *coahuilana* (holotype); petal, 7 $\frac{1}{2}$  $\times$ ; sepal, 7 $\frac{1}{2}$  $\times$ ; seed, 15 $\times$ ; habit,  $\frac{1}{2}$  $\times$ .

deltoid-ovate, the mature pedicels 4–7 mm. long, puberulent or stipitate-glandular, the outer ones spreading or deflexed. Sepals 5, 3.0–4.5 mm. long, 2–3 mm. broad, stipitate-glandular or glabrate, broadly ellipsoid to suborbicular, apically obtuse, the venation obscure, with 7–9 veins arising from the base, all but the midrib dichotomizing; petals 5, 2.5–3.5 mm. long, with about 6 subequal apical laciniae, these lance-deltoid, falcate, attenuate, and denticulate, the trunk longer than the laciniae, apically bilinguate, laterally lacerate, ca. 1.5 mm. broad, basally cordate, the claw binute; stamens 5, 2–3 mm. long, the oblong anthers 0.5–0.8 mm. long; staminodia conspicuous, flap-shaped, 0.4 mm. high, 0.8 mm. broad; ovary at anthesis ovoid, the style slightly exceeding the anthers, trifid less than one-fourth of its length. Capsule subglobose, exceeding the sepals, 3.0–4.5 mm. long, 10–20-seeded, the seeds hippocrepiform, 1.0–1.5 mm. long, densely hispidulous dorsally, ventrally slightly umbonate, the facies merely punctulate. Fig. 2A. (Holotype).

Known only from saline soils in the vicinity of Sierra del Rey and Laguna del Rey in Coahuila, Mexico.

The petals are completely unlike those of any other species and suggest the dorsal profile of a beetle. This peculiar aspect is approached, but only slightly, by the petals of the following species.

4. *DRYMARIA SUBUMBELLATA* I. M. Johnston, in Jour. Arn. Arb. 31:188. 1950.  
(HOLOTYPE: I. M. Johnston 8489, s. end of Cañada Oscuro near Tanque la Luz, confined to gypsum beds on the escarpment, western Coahuila; GH!)

Upright or ascending lignescent perennials to as much as 25 cm. high, the branches mostly opposite, the internodes longer or shorter than the leaves, glabrous or glaucescent, the taproot to 1 cm. thick. Leaves opposite or pseudovercillate, the blades 1.5–4.0 cm. long, 0.5–1.0 mm. broad, glabrous or glaucescent, succulent, linear, apically obtuse, attenuate to the sessile base; true stipules absent. Inflorescences of terminal subumbelloid 3–9-flowered cymes, the peduncles 4–8 cm. long, the bracts mostly imbricate, lance-ovate, 2.5–4.0 mm. long; mature pedicels 3–7 mm. long, glabrous, the outer ones spreading. Sepals 5, 5–6 mm. long, 2–3 mm. broad, glabrous or bullate, broadly ovate, apically obtuse or acutish, the margins involute, the venation obscure, with 7–9 veins arising from the base, all but the midrib dichotomizing; petals 5, 4.5–6.0 mm. long, with 6–8 subequal apical laciniae, these lance-deltoid, attenuate, falcate, denticulate, the trunk longer than the laciniae, laterally lacerate, basally truncate to rounded, 1.0–2.0 mm. broad; stamens 5, 3.5–4.0 mm. long, the oblong anthers 0.8–1.0 mm. long; staminodia obsolescent; ovary at anthesis ovoid, the style slightly exceeding the anthers, bifid or trifid less than one-fourth its length, nearly as long as the ovary. Capsule subglobose, 5–6 mm. long, exceeding the sepals, 10–20-seeded, the seeds hippocrepiform, 1.2–1.5 mm. long, dorsally provided with dense white hairs to 0.5 mm. long, ventrally umbonulate, the facies smooth or punctulate. Fig. 2B. (Holotype).

Known only from the type collection.

In the nature of the inflorescence and the petals, this bizarre species is intermediate between *D. elata* and the other two species in this homogeneous series.



5. *DRYMARIA SUFFRUTICOSA* A. Gray ex S. Watson, in Proc. Am. Acad. 17:328. 1882. (HOLOTYPE: *Palmer 74*; San Lorenzo de Laguna, Coahuila; GH!; isotypes at US, MO, UC, etc.!)

Upright suffrutescent glabrous perennials to as much as 30 cm. tall, the leaves often fascicled at the geniculate nodes, the taproot to as much as 8 mm. thick. Leaves pseudoverticillate, glabrous or glaucescent, somewhat succulent, linear, obtuse, 10–25 mm. long, ca. 1 mm. broad, basally tapering to the stem; stipules apparently lacking. Flowers globose in few-flowered terminal cymes, the peduncles and pedicels glabrous; bracts lanceolate, 3–5 mm. long, about equaling the pedicels. Sepals 5, 5–6 mm. long, 3–4 mm. broad, broadly ellipsoid, apically rounded but with a minute acumen, strongly venose throughout, the small scariose margins involute; petals 5, 4.5–5.5 mm. long, ca. 2 mm. broad, with 10–14 subequal apical laciniae, laterally lacerate, basally truncate or tapered to the minute claw; stamens 5, 4–5 mm. long, the oblong anthers ca. 1 mm. long; staminodia cupular, minute; ovary at anthesis renoid, the minute bifid style slightly exceeded by the anthers. Capsule broadly ellipsoid, ca. 6 mm. long, often capped by a stylopodium, many-seeded, the seeds hippocrepiform, ca. 0.9 mm. broad, dorsally provided with a row of stiff hairs to 0.5 mm. long. Fig. 2C. (Holotype).

Known only from the Coahuilan Desert of Mexico.

6. *DRYMARIA LYROPETALA* I. M. Johnston, in Journ. Arn. Arb. 21:68. 1940. (HOLOTYPE: *I. M. Johnston 7594*; 3.5 km. s. of Cedral, gypsum plain, locally common, GH!)

*Drymaria lyropetala* var. *coahuilana* I. M. Johnston, in Jour. Arn. Arb. 31:189. 1950. (HOLOTYPE: *R. N. Stewart 567* [cited as *Johnston 567* in original description]; 2 km. s. of Santa Elena, Sierra de las Cruces, Gypsum Ridge, Coahuila, GH!)

Upright or ascending glandular or glabrous perennials to as much as 30 cm. high, branching mostly at the base, the internodes shorter to longer than the leaves, apparently elongating belatedly, the taproot to 1 cm. thick. Leaves opposite or pseudoverticillate, 3–15 mm. long, 0.5–1.2 mm. broad, glabrous or glandular, glaucescent, succulent, linear, apically obtuse, attenuate to the sessile base, the upper leaves minutely stipulate. Inflorescences of terminal lax 3–9-flowered cymes, the peduncles 4–60 mm. long, glabrous to stipitate-glandular, the bracts 0.5–3.5 mm. long, remote, the mature pedicels 3–6 mm. long, glabrous or glandular, not recurved. Sepals 5, 3–5 mm. long, 1.5–3.0 mm. broad, glabrous to stipitate-glandular, ovate, apically obtuse, the venation obscure, with 7–9 veins arising from the base, all but the midrib dichotomizing; petals 5, 3.2–5.2 mm. long, with 10–12 unequal apical laciniae, these linear, obtuse, crenulate, the outermost as long as or longer than the trunk, the trunk laterally lacerate, basally cordate to truncate, 1–2 mm. broad; stamens 5, 3–6 mm. long, the oblong anthers 0.7–1.0 mm. long; staminodia cupular, to 0.4 mm. high; ovary at anthesis sub-cylindric, the style about as long, 1.5–2.5 mm. long, trifid about one-fourth its length; stylopodium well-developed. Capsule globose, 3.0–3.5 mm. long, 3–24-seeded, the seeds hippocrepiform, 1.0–1.5 mm. broad, ventrally umbonulate,

dorsally hispid, the hairs 0.2–0.3 (–0.5) mm. long, scanty and spreading. Fig. 1D. (Holotype of var. *lyropetala*); Fig. 1E (Holotype of var. *coahuilana*).

Local on gypsum soils of the Coahuilan Desert of Mexico.

The two varieties of this species may be separated by the following key:

1. Bracts 2–3.5 mm. long; leaves 5–15 mm. long, shorter than the internodes; plants glabrous to stipitate-glandular.....Var. COAHUILANA
2. Bracts 0.5–1.5 mm. long; leaves 3–6 mm. long, shorter to longer than the internodes; plants glabrous or with a few sessile glands.....Var. LYROPETALUM

Johnston erred very slightly in his description of the more southern var. *lyropetala*, stating that it was glabrous, the glandulosity occurring only in the northern variety. The type of var. *lyropetala* has a few scattered glands. It should be noted here that the UC isotype has leaves which are mostly longer than the internodes while the converse is true of the holotype, which incidentally is less conspicuously glandular.

#### C. Series STIPITATAE

7. DRYMARIA STIPITATA Fosberg, in Lloydia 4:281. 1941. (HOLOTYPE: C. H. Muller 3301; Mun. de Sierra Mojada, Sierra Mojada, Cañon de San Salvador; common in high oak chaparral; Coahuila; US!)

Upright suffrutescent perennials to as much as 20 cm. high, glabrous below, becoming stipitate-glandular above. Leaves opposite, the blades 5–15 mm. long, 1.5–5.5 mm. broad, glabrous, somewhat carinose, almost veinless, narrowly ovate to elliptic, apically acute, basally acutely tapering to the petiole, the petiole 1–2 mm. long; stipules apparently lacking. Inflorescences of few-flowered terminal cymes, the axes glandular-puberulent, locally densely so; bracts lance-ovate, 1.5–2.5 mm. long, apically acuminate; pedicels mostly 3–5 mm. long. Sepals 5, subequal, lanceolate to ovate, apically acuminate, basally umbonate, 5–6 mm. long, 1.5–2.5 mm. broad, transparent save for the 3 ribs; petals 5, 5.0–5.5 mm. long, apically and laterally lacerate, the laciniae linear, often dichotomous, some of the lateral laciniae directed downwardly; stamens 5, 5.0–5.5 mm. long, the broadly oblong anthers ca. 0.8 mm. long, alternating with 5 clavate staminodia to as much as 2.2 mm. long; ovary at anthesis ellipsoid, much shorter than the style, the style trifid for ca. one-fifth its length, exceeding the anthers. Capsule ca. 4 mm. long, 6–8-seeded, the seeds 0.8–1.0 mm. long, symmetrically hippocrepiform, the surfaces irregularly corrugated. Fig. 3A (Holotype).

Coahuila, Tamaulipas and probably Nuevo Leon, Mexico.

#### D. Series ARENARIOIDES

Leaves linear to narrowly ovate, opposite or pseudoverticillate, subsessile, stipulate. Flowers in cymes, racemes or solitary in the axils of slightly reduced foliaceous leaves. Sepals mostly obtuse and weakly nerved. Petals 2–8-lobed, the trunk much longer than the claw, entire or denticulate. Seeds hippocrepiform and dorsally sulcate or lacrimiform, nearly smooth or granular. Five species in western U. S., northern Mexico and Baja California. Figs. 3B, 3C, 4.

- a. Leaves linear, pseudovercillate, glabrous; flowers cymose, the bracts clearly different from the foliage leaves.....8. *D. MOLLUGINEA*
- a. Leaves linear to ovate, opposite or pseudovercillate; glabrous to densely stipitate-glandular; inflorescences tending to be racemose, the bracts often not different from foliage leaves.
- b. Plants stipitate-glandular; flowers in the axils of scarcely reduced foliage leaves or racemose:
- c. Flowers racemose, the petals mostly 4-6 lobed; leaves linear to oblong:
  - d. Petals 4.0-6.2 mm. long, mostly 6-lobed, the middle lobes nearly as long as the outer; sepals 4-7 mm. long; styles 1.0-2.5 mm. long, united more than half their length; continental Mexico.....9a. *D. ARENARIOIDES* ssp. *ARENARIOIDES*
  - d. Petals 2.8-4.0 mm. long, 2-6-lobed, the middle lobes about half as long as the outer; sepals 2.8-4.0 mm. long; styles 2.8-4.5 mm. long, united half their length or less. Baja California.....9b. *D. ARENARIOIDES* ssp. *PENINSULARIS*
  - c. Flowers axillary, the petals merely bifid; leaves ovate.....10. *D. AXILLARIS*
  - b. Plants without stipitate glands; flowers in cymes:
  - e. Leaves linear to oblong; petals occasionally trifid, briefly unguiculate; seeds brownish, tuberculate.....11. *D. BARKLEYI*
  - e. Leaves elliptic to ovate; petals bifid, exunguiculate; seeds yellowish, nearly smooth.....12. *D. POLYCARPOIDES*

8. *DRYMARIA MOLLUGINEA* (Lag.) Didr. in *Linnaea* 29:738. 1859. (HOLOTYPE: "*Lagasca 1806*" annotated by De Candolle in the De Candolle Herbarium; G. n. v.; photograph and drawing of type at GH!)

*Alsine molluginea* Lag. Gen. & Sp. 13. 1815.

*Arenaria ? molluginea* Ser. ex DC. Prodr. 1:400. 1824.

*Drymaria sperguloides* A. Gray, Pl. Fendler 11. 1849. (HOLOTYPE: Fendler 55; New Mexico, GH!; isotypes at US, UC, F, Mo, etc.)

*Lepigonum molluginea* Fries, Ind. Hort. Sem. 1856.

*Mollugophytum sperguloides* (A. Gray) M. E. Jones, Extr. Contr. West. Bot. 18:35. 1933.

Slender erect virgate or dichotomously branched annuals to as much as 20 cm. high, the internodes shorter to longer than the leaves, glabrous or with sessile glands, the tap root ca. 1 mm. thick. Leaves mostly pseudovercillate, glabrous or scantily glandular, 9-25 mm. long, 0.5-2.0 mm. broad, linear, apically obtuse, attenuate to the sessile base, the stipules lance-deltoid, 1-2 mm. long. Inflorescences of terminal cymose racemes, only the first 1 or 2 branches cymose, subsequent branching tending to be racemose, the peduncle 8-30 mm. long; bracts 1.0-2.5 mm. long, the pedicels 2-5 mm. long, glabrous to minutely stipitate-glandular. Sepals 5, 2.5-3.5 mm. long, glabrous or minutely glandular, oblong, apically obtuse and often cucullate, only the midrib prominent; petals 5, 1.7-2.5 mm. long, 0.4-0.7 mm. broad, apically provided with usually 4 lacinae, the outer one-third to one-half as long as the trunk, the inner occasionally absent or reduced to mere dentations, the trunk subdeltoid, laterally denticulate, truncate or tapered to the minute claw; stamens 5, 1.5-2.0 mm. long, the oblong to suborbicular anthers 0.4-0.5 mm. long; staminodia absent; ovary at anthesis globose, ca. 2 mm. long, the style 2-3-cleft nearly to the base, less than 1 mm. long; stylopodium absent. Capsule subglobose, 2-3 mm. long, exceeding the sepals, 3-17-seeded, the seeds 0.9-1.4 mm. broad, dark brown or purplish in age, hippocrepiform, dorsally flat, scarcely umbonate ventrally, minutely corrugated or tuberculate, the tubercles broader than long. Fig. 3B (Holotype of *D. sperguloides*); Fig. 3C ("*D. molluginea* Fenzl" at LE).

Sandy soils, Arizona to western Texas, U. S. A.; south to Puebla, Mexico.

The specimen from Leningrad (Fig. 3C) apparently from the Ledebour herbarium, and labeled "*Drymaria molluginea* Fenzl" lacks the inner laciniae of the petals. I doubt that this feature has any taxonomic significance. A close parallel is exhibited by *D. arenarioides* ssp. *peninsularis* where the form which lacks the two central laciniae has been described as *D. johnstonii*. In both *D. molluginea* and *D. arenarioides* ssp. *peninsularis* specimens have been examined in which 1 or 2 of many flowers dissected had the inner laciniae reduced to mere dentations or apparently completely lacking.

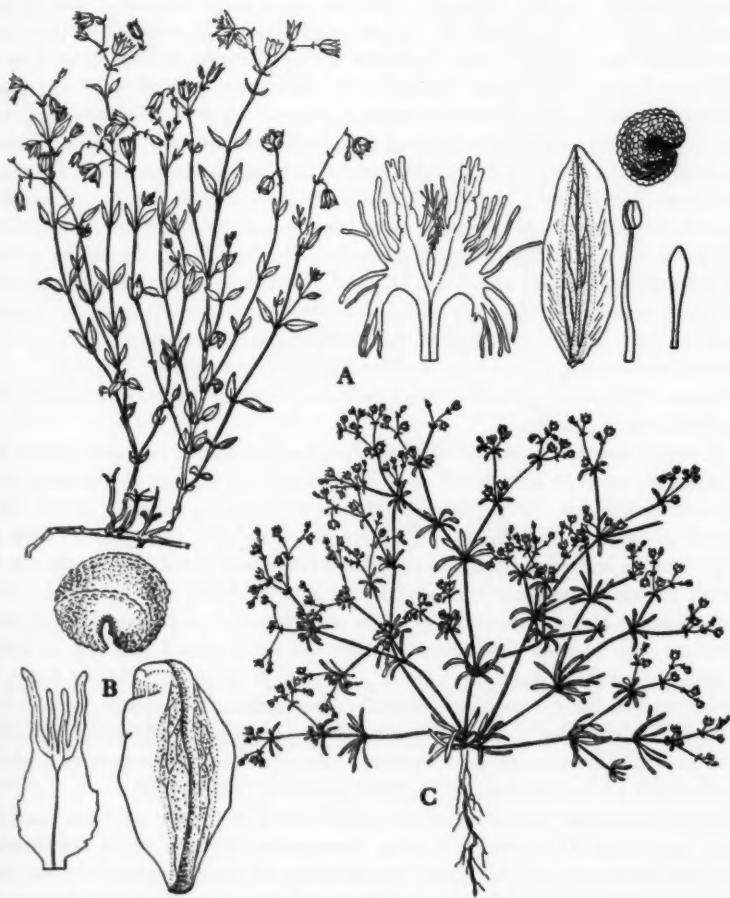


Fig. 3: A. *D. stipitata* (holotype); habit,  $\frac{1}{2}\times$ ; petal,  $6\times$ ; sepal,  $6\times$ ; stamen,  $6\times$ ; staminode,  $6\times$ ; seed,  $10\times$ . B. *D. molluginea* (holotype of *D. sperguloides*); petal,  $12\frac{1}{2}\times$ , seed,  $15\times$ ; sepal,  $12\frac{1}{2}\times$ . C. *D. molluginea* ("D. molluginea Fenzl." at LE); habit,  $\frac{1}{2}\times$ .

9a. *DRYMARIA ARENARIOIDES* ssp. *ARENARIOIDES*

*Drymaria arenarioides* Humb. & Bonpl. ex Roem. & Schult. Syst. Veg. 5:406. 1819.  
(HOLOTYPE: Humb. & Bonpl. 4070 ad Pachuca, probably destroyed at Berlin; isotype at Pl)

*Drymaria frankenioides* HBK. Nov. Gen. & Sp. 6:21. pl. 515. 1823.

Prostrate radially spreading herbaceous or lignescent perennials to as much as 20 cm. long, branching mostly at the base, the internodes shorter to longer than the leaves, stipitate-glandular, the taproot to as much as 5 mm. thick. Leaves opposite or pseudovercillate, stipitate-glandular, the blades linear-oblong to narrowly elliptic, apically obtuse, obscurely 1-nerved, 5–15 mm. long, 1–3 mm. broad, basally tapered to the petiole, the petiole ca. 1 mm. long; stipules lance-deltoid, 1.0–2.5 mm. long, entire. Flowers, except the first formed, solitary in the axils of slightly and gradually reduced foliage leaves, the mature pedicels 3–15 mm. long, stipitate-glandular, the subtending leaves stipulate. Sepals 5, 4–7 mm. long, 1–3 mm. broad, stipitate-glandular, oblong to broadly elliptic, the venation obscure, subdendritic, the inner sepals shorter, broader and less glandular; petals 5, 4.0–6.5 mm. long, apically (4–) 6–8-lobate, the outer lobes slightly longer and broader, about as long as the trunk, the inner lobes linear, equal, the trunk laterally denticulate, 0.8–1.5 mm. broad; stamens 5, ultimately 3–5 mm. long, the oblong anthers 0.8–1.2 mm. long; ovary at anthesis ellipsoid, the style bifid or trifid less than half its length, slightly exceeding the stamens; stylopodium often conspicuous. Capsule ovoid, 3–5 mm. long, 15–25-seeded, the seeds hippocrepiform, dorsally flattened or sulcate, exumbonate, minutely tuberculate, 0.8–1.2 mm. broad. Fig. 4A.

Sonora, Chihuahua, Zacatecas, San Luis Potosi, Guanajuato and Hidalgo, Mexico, usually in sandy soils.

It would appear that Humboldt and Bonpland or Kunth had some reason for changing the name *D. arenarioides* to *D. frankenioides* as Roemer and Schultes cited the name as follows: "D. arenarioides Humb. et Bonpl. . . . Reliqu. Willd. MS". I would judge that Willdenow had written the name "D. arenarioides Humb. & Bonpl." on his herbarium specimen and that Roemer and Schultes were the first to publish the name, probably furnished earlier by Humboldt and Bonpland. Two other names in *Drymaria* seem to have the same history, i.e. *D. ovata* and *D. stellarioides*. The question then arises whether the name should bear the authority "Humb. & Bonpl. in Roem. & Schult.", "Humb. & Bonpl.: Willd. ex Roem. & Schult." or "Willd. ex Roem. & Schult." Most publications appear to make use of the latter, but I feel it more proper to credit the name to Humboldt and Bonpland as did Willdenow in his herbarium. At any rate, *D. arenarioides* and *D. frankenioides* are names based on the same specimen (typonyms).

In its diminished leaves, sepals and petals, Parry & Palmer 49 from San Luis Potosi, approaches *D. arenarioides* subsp. *peninsularis*, but the petals, which seem to possess more constant characters, are like those of typical *arenarioides*, i.e. two larger outer lobes and two basally dichotomous inner lobes, the linear divisions of the inner lobes being nearly as long as the oblong outer lobes. The very long style of this specimen further corroborates its determination as *D. arenarioides* ssp. *arenarioides*.



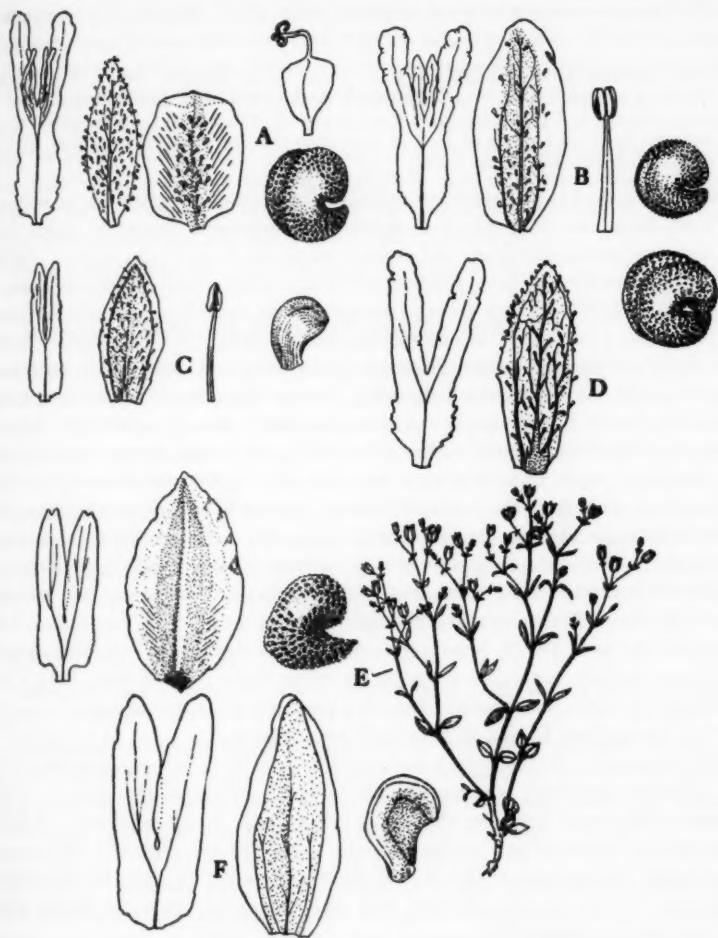


Fig. 4: A. *D. arenarioides* ssp. *arenarioides*; petal, 10 $\times$ ; outer sepal, 10 $\times$ ; inner sepal, 10 $\times$ ; gynoecium, 6 $\times$ ; seed, 15 $\times$ . B. *D. arenarioides* ssp. *peninsularis* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed 12  $\frac{1}{2}$   $\times$ . C. *D. axillaris* (isotype); petal, 5 $\times$ ; sepal, 5 $\times$ ; stamen, 5 $\times$ ; seed, 15 $\times$ . D. *D. arenarioides* ssp. *peninsularis* (holotype of *D. johnstonii*); petal, 10 $\times$ ; sepal 10 $\times$ ; seed, 20 $\times$ . E. *D. barkleyi* (holotype, except seed); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ ; habit,  $\frac{1}{4}$   $\times$ . F. *D. polycarpoides* (holotype, except seed); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ .

9b. *DRYMARIA ARENARIOIDES* ssp. *peninsularis* (S. F. Blake) J. Duke comb. & stat. nov.

*Drymaria peninsularis* S. F. Blake, in Jour. Wash. Acad. 14:285. 1924. (HOLOTYPE: *Purpus* 423; Cape Region, Baja California, US!; isotypes at UC, F, GH, MO)  
*Drymaria johnstonii* Wiggins, in Proc. Cal. Acad. 4<sup>25</sup>:203. 1944. (HOLOTYPE: I. M. Johnston 3972; in crevices of rock on mesa near crest of island, the isthmus, Espiritu Santo Island, Baja California, CAS!)

Radially spreading or ascending annuals or suffrutescent perennials to as much as 25 cm. long, branching mostly at the base, the internodes shorter to longer than the leaves, stipitate-glandular, the taproot to as much as 1 cm. thick. Leaves opposite or pseudovercillate, stipitate-glandular, linear, obtuse, obscurely veined, 4–25 mm. long, 0.5–1.0 mm. broad, attenuate to the sessile base, the stipules lance-deltoid, entire, 0.5–1.5 mm. long. Flowers, except the first formed, solitary in the axils of slightly and gradually reduced foliage leaves, the mature pedicels 4–12 mm. long, stipitate-glandular, the subtending leaves stipulate. Sepals 5, 2.8–4.5 mm. long, 1.0–2.2 mm. broad, stipitate-glandular, oblong to broadly elliptic, obtuse, the venation obscure, subdendritic, the inner sepals shorter, broader and less glandular; petals 5, 2.8–4.0 mm. long, apically 4(–8)-lobate, the outer lobes longer, about as long as the trunk, the inner about half as long as the outer, the trunk laterally denticulate, basally truncate or tapered to the minute claw; stamens 5, ultimately 2–3 mm. long, the oblong anthers 0.5–0.8 mm. long; ovary at anthesis obovoid, stipitate, the minute style slightly exceeded by the anthers. Capsule globose, 2.5–4.0 mm. long, the style less than 1 mm. long, trifid about half its length, the seeds 10–20, hippocrepiform, dorsally flattened or sulcate, scarcely umbonate ventrally, reticulate or minutely tuberculate, 0.6–1.0 mm. long. Fig 4B (Holotype of *D. peninsularis*); Fig. 4D (Holotype of *D. johnstonii*).

Sandy soils; Cape Region of Baja California, Mexico.

Unquestionably this subspecies is intimately related to ssp. *arenarioides*. The two subspecies are nicely separated by the Gulf of California in addition to the diagnostic characters listed in the key. I have seen many specimens of both subspecies, and intermediates are few indeed. *Craig* 738 and *Howell* 10576 appear to represent intermediates with many of the petals similar to those of the typical subspecies. Other features, coupled with the geography, seem to justify their relegation to ssp. *peninsularis*.

10. *DRYMARIA AXILLARIS* Brandege, in Univ. Cal. Publ. Bot. 4:178. 1911.  
(HOLOTYPE: *Purpus* 4526; Sierra del Rey, Coahuila, UC!; isotypes at GH, US, F, MO, etc.)

Upright glandular-pubescent, cyanic glaucous perennials to 10 cm. high with many suffrutescent branches arising near the base, the taproot to 6 mm. in diameter. Leaves opposite, cyanic, glaucous, densely glandular-pubescent with capitate hairs to 0.7 mm. long, broadly ellipsoid, apically obtuse to acutish, basally subcordate or tapered to the petiole, 3–12 mm. long, 2.5–8.0 mm. broad; veins not apparent; petioles 0.5–2.0 mm. long, the stipules entire, broadly deltoid, 0.5–1.0 mm. long. Flowers solitary in the axils of reduced leaves, the glandular-pubescent pedicels

ebracteate, 1.5–3.0 mm. long. Sepals 5, subequal, subsucculent, glandular-pubescent, broadly lanceolate to ovate, slightly concavo-convex, obtuse to acutish, 4–5 mm. long, 1.5–2.0 mm. broad; venation obscure, the margins scariose; petals 5, 3.5–4.0 mm. long, bifid about half their length, the lobes obtuse, ca. 0.6 mm. broad, exappendiculate, the claw 0.5–1.0 mm. broad; stamens 5, 3.0–3.5 mm. long, the oblong anthers ca. 0.8 mm. long; ovary at anthesis broadly ellipsoid, the style bifid about one-third its length, slightly exceeding the anthers. Capsule bivalved, ca. 2.5 mm. long, many-seeded, the seeds hippocrepiform, merely reticulate or punctulate, ca. 0.7 mm. broad. Fig. 4C (Isotype).

Known only from the type locality in Coahuila, Mexico.

11. *DRYMARIA barkleyi* J. Duke and Steyermark sp. nov.

Plantae annuae graciles ramis paucis internodis glaucis quam foliis longioribus radice non viso. Folia opposita laminis glabris glaucis bullatisque 4–10 mm. longis, 1.0–2.5 mm. latis, ellipticis apice obtusis subsessilibus stipulis minutis deltoideis caducis apice saepe bifidis. Flores solitarii in axillis foliorum vix reductorum pedicellis glabris 4–8 mm. longis. Sepala (4–) 5, 3.0–4.5 mm. longa ca. 1 mm. lata glabra oblongo-elliptica obscuriter venosa; petala 5, 2.5–3.5 mm. longa ultra medium bifida vel rariter trifida lobis oblongis obtusis emarginatisve denticulatis basi acutis unguibus minutis; stamina (4–) 5, 3 mm. longa antheris oblongis 0.8–1.0 mm. longis; ovarium oblongum, 1–2 mm. longum saepe 10-ovulatum stylis ca. 1.5 mm. longis (3–) 4-lobis minutis. Capsulae non visae. Fig. 4E (Holotype [except seed]).

COAHUILA: low pointed hill, almost destitute of soil, apparently a limestone shale, 25 mi. sw. of Monterrey, Warnock & Barkley 148 26 M. (HOLOTYPE: F, isotype at US).

Fortunately another specimen with mature capsules is referable to the new species. Hernandez, Rowell & Barkley 16M531, collected on talc-like limy soil and shaly limestone, (in Nuevo Leon), 11 mi. w. of Santa Catarina differs only in having a few sessile glands on the herbage. The capsule is yellow, 3–4-toothed, 2.5–3.0 mm. long, 4–8 seeded. The seeds are lacrimiform, ca. 0.7 mm. in diameter, minutely and remotely tuberculate. Apparently the closest related species is the preceding with which the new species shares the cyanic tinting, solitary axillary flowers, and minute deltoid stipules. The differences far outnumber the strictly superficial similarities however. The sharply pointed long-beaked seed is slightly reminiscent of *D. debilis*.

12. *DRYMARIA POLYCARPOIDES* A. Gray, Pl. Fendl. 12. 1849. (HOLOTYPE: Gregg s. n.; valley of Bolsón de Mapimí, Mexico; GH!)

Prostrate or ascending profusely branching perennials to as much as 10 cm. long, branching mostly from the base, the nodes geniculate, fragile, the internodes mostly shorter than the leaves, glabrous or quite glaucous, the taproot to as much as 1 cm. thick. Leaves opposite, carnose, glaucous, often cyanic, elliptic, apically acute to obtuse, basally tapered, 5–12 mm. long, 2–5 mm. broad, weakly if at all nerved; petioles 0.5–1.5 mm. long, exceeding the minute, entire, lance-deltoid

stipules. Flowers in few-flowered strongly dichotomous cymes, the pedicels 1-4 mm. long, the bracts deltoid, obtuse, not scarious, 0.8-1.5 mm. long. Sepals 5, 3.5-5.0 mm. long, 1.5-2.0 mm. broad, glaucous, oblong to ovate, apically obtuse and often cucullate, the scarious margin as broad as or broader than the central 3-nerved portion; petals 5, 3.5-4.5 mm. long, bifid little more than half their length, the lobes broadly oblong, apically obtuse, 1-3-nerved, merging imperceptibly with the trunk, the trunk 1.0-1.5 mm. long, nearly as broad, exunguiculate or subexunguiculate; stamens 5, the anthers 0.8-1.0 mm. long, the filaments 1.5-2.5 mm. long, devoid of staminodia; ovary at anthesis ovoid, equaled or exceeded by the style, the style trifid for less than one-fourth its length. Capsule ellipsoid to oblongoid, 2.0-2.5 mm. long, few-seeded, the seeds lacrimiform, not circinate, umbonulate ventrally, smooth, yellowish-brown. Fig. 4F (Holotype [except seed]).

Known only from the Coahuilan Desert of Mexico.

#### E. Series VISCOSAE

13. *DRYMARIA VISCOSA* S. Watson ex Orcutt, in West. Am. Sci. 2:57. 1886. *nomen nudum*. S. Watson in Proc. Am. Acad. 22:469. 1887. (HOLOTYPE: Orcutt 1330, Socorro ("Socono"), n. Baja California, GH!; isotypes at UC, D, F, US, MO, NY, etc.)

Prostrate radially spreading or ascending diffusely branched viscid annuals, the branching below the inflorescence mostly dichotomous, the taproot to as much as 5 mm. thick. Leaves pseudovercillate or opposite, glandular-puberulent, linear, apically obtuse, basally tapering to the clasping petiole, 3-15 mm. long, 0.5-1.5 mm. broad, the petiole 1-3 mm. long; stipules acicular, caducous, 1.0-1.5 mm. long. Flowers campanulate in 1-5-flowered cymes, the peduncles mostly glabrous; bracts deltoid, marginally ciliate, 0.5-1.0 mm. long, the pedicels 0-3 mm. long, all but the central equaled or exceeded by the bracts. Sepals 5, 2.3-3.0 mm. long, 1-1.5 mm. broad, glandular-puberulent, oblong, obtuse, obscurely 3-nerved, the midrib subapically excurrent; petals 5, 1.8-2.2 mm. long, bifid about two-thirds their length, the lobes oblong, obtuse, tapered to the unguiculate base, exappendiculate; stamens 5, ca. 2 mm. long, the broadly oblong anthers ca. 0.4 mm. long; ovary at anthesis ellipsoid, about equaled by the style, the style trifid about half its length, barely exceeding the anthers. Capsule 2.0-2.5 mm. long, equaling or exceeded by the sepals, 5-15-seeded, the seeds cochleate, nearly smooth, 0.5-0.6 mm. broad, dorsally brown, facially transparent and colorless, the yellowish embryo visible. Fig. 5A (Isotype).

Sandy soils of Baja California, Mexico.

In habit, this plant is not unlike *D. molluginea* as pictured in Fig. 3D.

#### F. Series ORTEGIOIDES

14. *DRYMARIA ORTEGIOIDES* Griseb. Cat. Pl. Cub. 21. 1866. (HOLOTYPE: Wright 2010; Cuba occ., GOET!; isotypes at F, GH, MO, US, etc.)  
*Pinosia ortegioides* (Griseb.) Urban, in Ark. Bot. 23A5:71. 1930.

Upright sparsely dichotomizing glabrous or glandular perennials to as much as 20 cm. high, the internodes much longer than the leaves, the tap root to 5 mm. thick. Leaves opposite, glabrous, linear to elliptic, apically acute to obtuse, attenuate to the sessile base, 3–12 mm. long, 1.0–3.5 mm. broad, the stipules lance-deltoid, 0.3–0.8 mm. long, entire. Inflorescences of terminal condensed 5–21-flowered dichotomous cymes; peduncles 1.5–3.5 cm. long, the bracts 1–2 mm. long, imbricate or subimbricate, the glabrous pedicels 1.5–4.0 mm. long. Sepals 5, 2.5–3.5 mm. long, glabrous, ovate to obovate, acute to obtuse, the venation obscure, dichotomous and reticulate; petals 3, 2.3–3.2 mm. long, twice dichotomous, the lobes oblong, obtuse, nearly as long as the trunk, exappendiculate, the trunk merging gradually with the claw; stamens 3, the oblong anthers ca. 0.5 mm. long; ovary subglobose, the styles 0.5–1 mm. long. Capsule globose, 1.5–2.0 mm. long, shorter than the sepals, 1–4-seeded, the seeds hippocrepiform, scarcely if at all umbonulate, closely tuberculate, 1.0–1.5 mm. long, dark brown. Fig. 5B, 5C.

Sandy savannas of Cuba.

#### G. Series EXCISAE

Leaves deltoid-ovate to reniform, opposite, stipulate. Flowers long-pedicellate in lax cymes. Sepals acute or obtuse, trinerved. Petals bifid, the lobes themselves dichotomizing, ciliate-auriculate at their bases. Seeds cochleate, tuberculate, the tubercles domical or substellate. 3 species in Mexico. Fig 5 D–F.

- a. Plants merely glandular-puberulent to glabrous; leaves deltoid-ovate to reniform, rounded to acute at the base; petals apically 2–4-times dichotomous.
- b. Leaves deltoid-ovate; sepals and petals ca. 5 mm. long, the petals 4 times dichotomous. ....15 D. HYPERICIFOLIA
- b. Leaves orbicular to cordate or reniform; sepals 5.0–10.0 mm. long; petals 6–12 mm. long, 2–3 times dichotomous. ....16 D. EXCISA
- a. Plants stipitate-glandular to villose; leaves ovate to reniform, subcordate at the base; petals 1–2-times dichotomous, if only once dichotomous, the veins and usually the apex giving evidence of the second dichotomy. ....17 D. LONGEPEDUNCULATA

15. DRYMARIA HYPERICIFOLIA Briq. in Ann. Cons. & Jard. Geneva 14:369. 1911.  
(HOLOTYPE: *Jurgenson 38*, de Lecambre de Yolotepeque à Juquilla, au sud-ouest d'Oaxaca; Mexico G!; isotype at K)

Erect or ascending perennials (?) to as much as 25 cm. high, the internodes about as long as the leaves, stipitate-glandular. Leaves opposite, 8–22 mm. long, 5–14 mm. broad, narrowly deltoid-ovate, glabrous or minutely glandular-puberulent below, apically acute, marginally somewhat undulate, basally obtuse to acute, plinerved; petioles 1–2 mm. long, the stipules entire or bifid, the divisions lance-deltoid, 0.5–1.2 mm. long. Inflorescences of terminal 5–11-flowered cymes, the peduncles 2–3 cm. long, the bracts lanceolate, 1.5–2.5 mm. long, the pedicels stipitate-glandular, 4–6 mm. long. Sepals 5, 4.5–5.5 mm. long, lanceolate to narrowly ovate, apically acute, the outer sepals scantily stipitate-glandular, trinerved; petals 5, ca. 6 mm. long, four times dichotomous, the ultimate segments emarginate, the trunk laterally provided with deciduous ciliate auricles; stamens 5, ca. 4 mm. long, the anthers oblong, ca. 0.7 mm. long; ovary at anthesis ellipsoid, about equaled by the partially trifid style, the style slightly exceeded by the anthers.

Capsule ellipsoid, ca. 5 mm. long, 3-valved, apically constricted, many-seeded, the seeds cochleate, 0.7–1.0 mm. long, irregularly corrugated or tuberculate; seeds immature. Fig. 5D (Holotype).

Known only from two collections near Juquila in Oaxaca, Mexico.

North American authors have confused *Drymaria ladevii* with this species, probably because of certain vegetative resemblances. The flowers of the two species however contrast vividly.

16. *DRYMARIA EXCISA* Standl. in Field Mus. Bot. 8:11. 1930. (HOLOTYPE: *Mexia* 1748; Real Alto, trail to El Tajo de Santiago, 2500 m., Jalisco, Fl; isotypes at UC, GH, etc.)

*Drymaria grandis* Bullock, in Kew Bull. 1936:389. 1936. (HOLOTYPE: *Hinton* 5427, Los Hornos, Temascaltepec, 2500 m., Mexico, Kl; isotypes at GH, MO, etc.)

Robust spreading perennials, the procumbent or erect branches to 3 m. long (fide Bullock), the internodes mostly longer than the leaves, glandular-puberulent, glabrescent. Leaves opposite, 5–25 mm. long, 5–30 mm. broad, glabrous or minutely glandular, the blades orbicular to obcordate, apically emarginate or apiculate, marginally entire, basally obtuse to truncate, 3-plexi-nerved; petioles 5–25 mm. long, the stipules entire or apically lacerate, lanceolate, 2–4 mm. long. Inflorescences of terminal lax 3-many-flowered cymes, the peduncles 3–6 (–15) cm. long; bracts lanceolate to ovate, 3.0–4.5 mm. long, the pedicels 3–15 mm. long, stipitate-glandular, glabrescent. Sepals 5, 5.0–10.0 mm. long, 2.0–2.8 mm. broad, ovate, apically acute, weakly 3-ribbed; petals 5, 6–12 mm. long, 2–3-times dichotomous, the ultimate segments entire or emarginate, the trunk laterally provided with several deciduous ciliate auricles; stamens 5, 5.0–6.5 mm. long, the oblong anthers ca. 1 mm. long, the staminodia minute, semicircular; ovary at anthesis ovoid, about equaling the style, the style 1.5–3.0 mm. long, trifid about one-third its length. Capsule ellipsoid, apically constricted, 3.0–5.5 mm. long, many-seeded, the seeds tightly cochleate, 0.9–1.2 mm. broad, evenly tuberculate, the dorsal tubercles somewhat longer than broad, the facial tubercles polygonal (rarely substellate) in outline. Fig. 5E (Holotype).

Jalisco, Michoacan, Mexico, and Morelos, Mexico, usually above 2000 m.

It is interesting to note that in none of the original descriptions of taxa referable to this species (or series) was any mention made of the polydichotomous nature of the petals. This may be due to the fact that the foliage is so outstanding that the species can usually be determined without resorting to the tedium of dissection.

17. *DRYMARIA LONGEPEDUNCULATA* S. Watson, in Proc. Am. Acad. 25:142. 1890. (HOLOTYPE: *Pringle* 2121; under ledge of the barranca near Guadalarajara, GH!; isotypes at UC, US, etc.)

Laxly spreading or rarely erect annuals, the internodes mostly longer than the leaves, villous with spreading jointed hairs or stipitate-glandular. Leaves opposite, 5–14 mm. long, 5–20 mm. broad, villous to glabrous, reniform to deltoid-ovate, apically rounded to acute and apiculate, marginally entire, basally truncate or



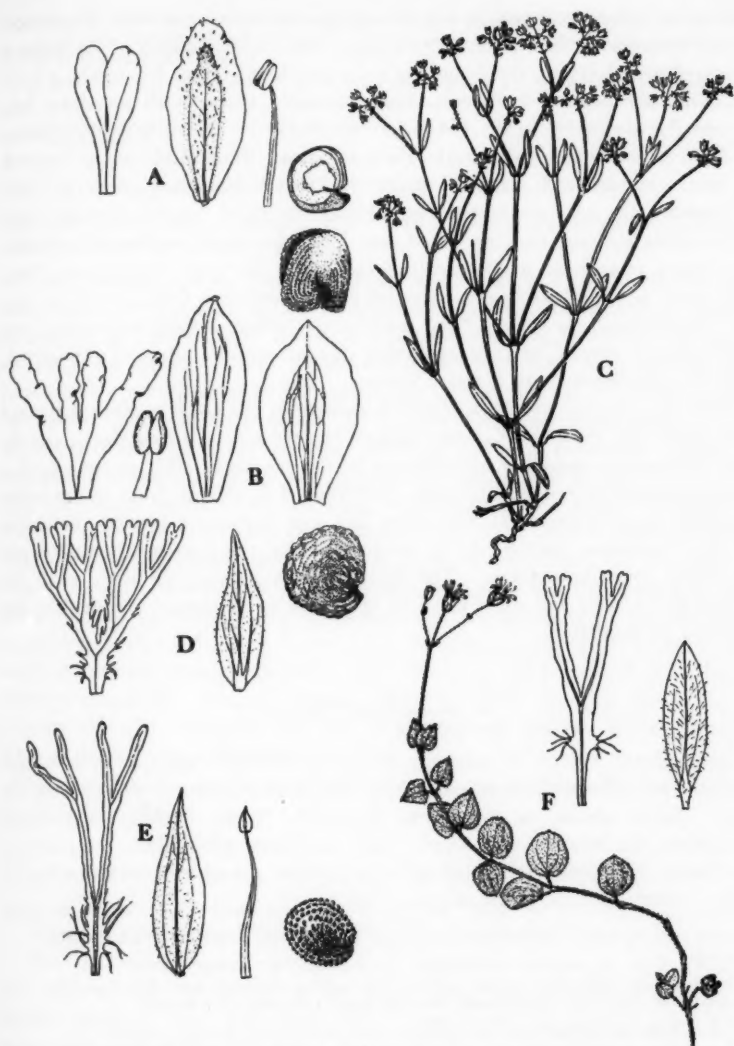


Fig. 5: A. *D. viscosa* (isotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 15 $\times$ . B. and C. *D. ortegioides*; petal, stamen, outer and inner sepals, all 10 $\times$  (from holotype); seed, 10 $\times$ ; habit,  $\frac{1}{2}\times$ . D. *D. hypericifolia* (holotype); petal, 10 $\times$ ; sepal, 5 $\times$ ; seed, 20 $\times$ . E. *D. excisa* (holotype); petal, 4 $\times$ ; sepal, 4 $\times$ ; stamen, 4 $\times$ ; seed, 10 $\times$ . F. *D. longepedunculata* (holotype); habit,  $\frac{1}{2}\times$ ; petal, 5 $\times$ ; sepal, 5 $\times$ .

cordate, 3-7-ply-nerved; petioles 1-6 mm. long, stipules entire or bifid, the divisions filiform to narrowly lanceolate, 1.0-1.5 mm. long. Inflorescences of lax terminal 3-many-flowered cymes, the peduncles 1-10 cm. long; bracts lanceolate, 1.5-2.5 mm. long, the pedicels 5-25 mm. long, sparingly villose with glandular hairs occasionally admixed. Sepals 5, 4.2-5.5 mm. long, 1.7-2.7 mm. wide, glabrous to villose, narrowly to broadly ovate, the outer acute, villose, and weakly 3-nerved, the inner rounded and glabrous; petals 5, 5.6-7.0 mm. long, once or twice dichotomous, the ultimate segments emarginate, the trunk laterally provided with several ciliate auricles; stamens 5, 4-5 mm. long, the oblong anthers 0.8-1.0 mm. long; ovary at anthesis subglobose, 1-2 mm. long, the style 2.0-2.5 mm. long, trifid about one-third its length, exceeded by the anthers. Capsule 3.5-5.0 mm. long, many-seeded, the seeds 0.7-0.9 mm. long, cochleate, evenly tuberculate, the dorsal tubercles conical, the facial tubercles elongate-stellate. Fig. 5F (Holotype).

Jalisco, Michoacan, and Mexico, Mexico.

Here the tendency toward a second dichotomy in the petals is often suppressed to the point that the petal is merely bilobed, but the lobes are emarginate, and the twice-dichotomous nature is still reflected in the venation. This species affords a good transition to the series *VILLOSAE*. *McVaugh & Koelz 897* from Jalisco makes a marked approach toward *D. multiflora*, and may represent a hybrid. Indicative of hybrid tendencies are the broadly reniform leaves, the absence of villosity, and the weakly emarginate petals. The floral parts in general are a bit small for *D. longepedunculata* and come closer to the range of dimension exhibited by the flowers of *D. multiflora*.

#### H. Series LEPTOPHYLLA

Leaves linear, oblong or narrowly spatulate, subsessile, stipulate, the stipules usually entire. Flowers in bracteate cymes, the pedicels longer or shorter than the bracts. Sepals obtuse to acuminate, trinerved. Petals bilobed, unguiculate, exauriculate, the lobes 1(-3)-nerved. Seeds cochleate, tuberculate, the tubercles not ornate. Two polymorphic intergrading delicate annual (or rarely perennial) species; western U. S. A. to Guatemala. Fig. 6.

- a. All the sepals obtuse, often cucullate; seeds laxly cochleate, the anterior end not strongly recoiled:
  - b. Plants usually taller than 5 cm., subvirgate, branching above the base; bracts mostly equaled or exceeded by the subtended pedicels; lobes of the petals 1-3-nerved.
    - c. Peduncles and pedicels stipitate-glandular; lobes of the petals oblong, 1-nerved.....18a. *D. EFFUSA* var. *EFFUSA*
    - c. Peduncles and pedicels glabrous or with sessile glands; lobes of the petals obovate, mostly trinerved.....18b. *D. EFFUSA* var. *CONFUSA*
  - b. Plants minute, mostly less than 5 cm. tall; branching mostly from the base and in the inflorescence; bracts mostly exceeding the subtended pedicels; lobes of the petals 1-nerved.....18c. *D. EFFUSA* var. *DEPRESSA*
- a. Some or all of the sepals acute to acuminate; seeds tightly cochleate, the anterior end strongly recoiled.
  - d. Peduncles, pedicels and sepals devoid of stipitate-glands, the pedicels mostly shorter than the subtending bracts; petals bifid half their length or less, shorter than the sepals.....19a. *D. LEPTOPHYLLA* var. *LEPTOPHYLLA*

- d. Peduncles and often the pedicels and sepals stipitate-glandular, the pedicels mostly longer than the subtending bracts; petals bifid for more than half their length, included by or exerted from the calyx:
- e. Sepals lanceolate, exceeding the petals, not stipitate-glandular; plants subsuffrutescent. ....19b. *D. LEPTOPHYLLA* var. *COGNATA*
- e. Sepals ovate, equaled or exceeded by the petals, usually stipitate-glandular; plants not suffrutescent. ....19c. *D. LEPTOPHYLLA* var. *NODOSA*

18a. *DRYMARIA EFFUSA* var. *EFFUSA*

*Drymaria effusa* A. Gray, Pl. Wright. 2:19. 1853. (HOLOTYPE: Wright 869, mountains east of Santa Cruz, Sonora, GH!)

Erect, delicate, sparsely branched annuals to as much as 25 cm. high, the internodes mostly longer than the leaves, minutely glandular-puberulent or glabrate, the roots to ca. 1 mm. thick. Basal leaves pseudovercillate, spatulate to orbicular; cauline leaves opposite, rarely pseudovercillate, 5–25 mm. long, 0.5–1.2 mm. broad, minutely puberulent or glabrous, linear, apically obtuse or apiculate, sessile, the stipules entire, acicular, caducous, 0.5–1.0 mm. long. Inflorescences of terminal multifloriferous cymes, the ultimate branches showing tendencies to become monopodial; peduncles 2–5 cm. long, stipitate-glandular; bracts ovate, 0.5–1.8 mm. long, the mature pedicels 1–5 mm. long, stipitate-glandular, usually exceeding the bracts. Sepals 5, 1.4–2.2 mm. long, the outer narrower, shorter, more obtuse and often cucullate, glandular, the inner more ovate, often acutish, all trinerved, the veins subapically confluent; petals 5, 2–4 mm. long, bifid half their length or more, the lobes linear to oblong, 1-nerved, obtuse, tapering gradually to the claw, exappendiculate; stamens 5, 1.2–1.6 mm. long, the oblong anthers ca. 0.3 mm. long; ovary at anthesis ellipsoid, the style rather elongate, trifid about half its length, about attaining the anthers. Capsule ellipsoid, nearly equaling the sepals, the stigmata exerted; seeds 2–9, cochleate to lacrimiform, coarsely tuberculate, 0.5–0.8 mm. broad. Fig. 6B (Holotype).

Arizona, U.S.A.; Sonora and Sinaloa, Mexico, the Sinaloa specimens approaching *D. leptophylla*.

18b. *DRYMARIA EFFUSA* var. *confusa* (J. N. Rose) J. Duke comb. & stat. nov.

*Drymaria confusa* J. N. Rose, in Contr. U. S. Nat. Herb. 5:133. 1897. (HOLOTYPE: Palmer 59, southwestern Chihuahua, US!, isotypes at GH, MO, etc.)

Delicate sparsely branching glabrous or subglabrous annuals to as much as 7.5 cm. high, scarcely branching at the base. Basal leaves glabrous, orbicular to broadly elliptic, 2.5–3.5 mm. long, 2.5–3.0 mm. broad, the petioles 1.5–2.5 mm. long; cauline leaves linear to oblong, obtuse, slightly narrowed to the clasping base, 10–20 mm. long, ca. 1 mm. broad, the stipules entire, acicular, 0.5–1.0 mm. long. Inflorescences of terminal diffuse several-flowered cymes, the glabrous peduncles 10–25 mm. long; bracts ovate to narrowly lance-deltoid, 0.5–0.8 mm. long, scariose and transparent save for the darkened midrib; pedicels glabrous, 2–8 mm. long, at maturity usually longer than the flowers. Sepals 5, 1.5–2.2 mm. long, 0.5–0.7 mm. broad, minutely glandular, broadly oblong, apically obtuse, transparent save for the 3 ribs; petals 5, 2.0–2.5 mm. long, bifid about half their length, the lobes spatulate to narrowly oblong, trinerved, exappendiculate, merging imper-

ceptibly with the narrower claw; stamens (3?-) 5, ca. 2 mm. long, the oblong anthers ca. 0.4 mm. long; ovary at anthesis ellipsoid, slightly exceeded by the anthers, the slightly trifid style exceeding the anthers. Capsule ca. 1.8 mm. long, few seeded, the seeds cochleate, minutely tuberculate, ca. 0.6 mm. long. Fig. 6C (Holotype).

Chihuahua and Durango, Mexico.

*Nelson 4813* is determined as this variety only with some misgivings. All the sepals are obtuse and cucullate and many of the pedicels are exceeded by the subtending bracts, in these respects approaching var. *depressa*. Although suggestive of var. *depressa*, this plant's upright habit and obovate 3-nerved petal-lobes deny this possibility.

18c. *DRYMARIA EFFUSA* var. *depressa* (Greene) J. Duke comb. & stat. nov.

*Drymaria depressa* Greene, Leaf. Bot. Obs. 1:153. 1905. (HOLOTYPE: *Metcalf 1430*; open glades of the Black Range, alt. 9,500 ft., N. Mex., ND; isotypes at F, GH, MO, UC, US, etc.)

*Drymaria minuscula* Standl. & Steyerl. in Field Mus. Bot. 23:52. 1944. (HOLOTYPE: *Steyermark 50243*; on rocky limestone outcrops under *Juniperus standleyi*, alt. 3700 m., vicinity of Chémal, summit of Sierra de los Cuchumatanes, dept. Huehuetenango, Guatemala, F!)

Minute, subcespitose, glabrous to minutely puberulent annuals rarely to 5 cm. high, the branching largely confined to the base and the inflorescence. Rosette leaves orbicular to spatulate, 1.5–10.0 mm. long, 1–3 mm. broad; cauline leaves when present opposite, the blades oblong, 3–10 mm. long, 1–4 mm. broad, apically obtuse, basally tapered, subsessile, the stipules entire, 0.5–1.2 mm. long, acicular, caducous. Inflorescences of terminal lax (rarely condensed) several-flowered cymes, the bracts 1.5–2.0 mm. long, mostly longer than the pedicels, the pedicels and peduncles glabrous or glandular. Sepals 5, 1.5–2.5 mm. long, ca. 1 mm. broad, glabrous or glandular, oblong to ovate, apically obtuse, cucullate, 3-ribbed, the ribs subapically confluent; petals 5, 1.5–2.8 mm. long, bifid about half their length, the lobes linear to narrowly oblong, apically obtuse, usually 1-nerved, gradually tapering to the claw; stamens 5, 0.7–1.7 mm. long, the oblong anthers 0.2–0.3 mm. long; ovary at anthesis globose to obturbinate, the styles 2–3-fid about half their length, about equaling the anthers. Capsule ellipsoid to subglobose, about equaling the sepals, 6–12-seeded, the seed cochleate to lacrimiform, 0.5–0.7 mm. long, dorsally sulcate, minutely tuberculate. Fig. 6A. (Isotype).

High altitudes, New Mexico, Colorado and Arizona, U. S. A., south to Guatemala.

As a rule this is quite a distinctive variety but it is probable that it hybridizes with other members of the series. *Metcalf 1428* strongly suggests that hybridization has occurred with *D. leptophylla* or one of its varieties. Except rarely, *D. leptophylla* and *D. effusa* var. *depressa* are quite distinct, the former being characterized by an elongate subvirgate habit, the capsules shorter than the inner acute sepals, and the deeply cleft style, the latter being differentiated by the dwarf subcespitose habit, the capsules about equaling the obtuse, cucullate inner sepals, and the shallowly cleft style.



Fig. 6: A. *D. effusa* var. *depressa* (isotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; flower, 10 $\times$ ; seed, 20 $\times$ ; habit,  $\frac{3}{4}\times$ . B. *D. effusa* var. *effusa* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 15 $\times$ . C. *D. effusa* var. *confusa* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 10 $\times$ . D. *D. leptophylla* var. *cognata* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 15 $\times$ . E. *D. leptophylla* var. *nodosa* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 15 $\times$ . F. *D. leptophylla* var. *nodosa* (holotype of *D. gentryi*); petal, 15 $\times$ ; sepal, 15 $\times$ ; stamen, 15 $\times$ ; seed, 15 $\times$ . G. *D. leptophylla* var. *leptophylla* (isotype of *D. gracillima*); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 15 $\times$ .

In correspondence with Dr. Steyermark, I have suggested to him that *D. minuscula* probably represents an alpine reduction of what I here reduce to the var. *depressa*, and he tends to agree with this disposition of his diminutive species. The type from Guatemala has somewhat reduced nodes, leaves, sepals, etc., but such reductions also occur at the other end of the range of the variety, e.g. Colorado, and it seems doubtful that such diminutions are worthy of formal status.

19a. *DRYMARIA LEPTOPHYLLA* var. *LEPTOPHYLLA*

*Drymaria leptophylla* (Cham. & Schlecht.) Fenzl ex Rohrb. in *Linnaea* 37:195. 1871. (HOLOTYPE: *Schiede & Deppe 511*; ad radices montis Orizabae, B; *n.v.*)

*Arenaria leptophylla* Cham. & Schlecht. in *Linnaea* 5:233. 1830.

*Drymaria tenella* A. Gray, Pl. Fendl. 12. 1849. (HOLOTYPE: *Fendler 56*; eight miles west of las Vegas, New Mexico; GH!)

*Drymaria nodosa* var. ? *gracillima* Hemsl. Diag. Pl. Nov. 2:22. 1879. (HOLOTYPE: *Perry & Palmer 60*; in regione San Luis Potosi, alt. 6000-8000 ped., Mexico, K *n.v.*; isotypes at MO, GH, etc.!)

*Drymaria gracillima* (Hemsl.) J. N. Rose, in Contr. U. S. Nat. Herb. 5:132. 1897.

Erect delicate, usually sparsely branched annuals to as much as 20 cm. high, the internodes much longer than the leaves, glabrous to minutely glandular, the taproot ca. 1 mm. thick. Leaves opposite, rarely pseudoverticillate, glabrous, linear to narrowly oblong, 5-25 mm. long, 0.5-1.0 mm. broad, often involute and circinate, apically obtuse or acute, tapered to the subsessile base; stipules entire, 0.2-0.8 mm. long, acicular, caducous. Inflorescences of terminal many-flowered dichasial cymes, the peduncles 1-5 cm. long, glabrous to minutely glandular; bracts ovate, 0.5-1.0 (-1.5) mm. long, equaling or exceeding the pedicels. Sepals 5, ovate, 1.5-3.5 mm. long, narrowly ovate, apically acute and often somewhat reflexed (the outer sepals obtuse and cucullate in some northern material), 3-ribbed, glabrous or with a few sessile glands; petals 5, 1.2-2.4 mm. long, bifid about half their length, the lobes linear, obtuse or acute; stamens 5, 1.0-1.5 mm. long, the suborbicular anthers ca. 0.2 mm. long, the filaments basally and briefly connate; ovary at anthesis subglobose, the style about attaining the anthers, divided nearly to the base. Capsule 1.5-2.0 mm. long, 5-20-seeded, the seeds cochleate, 0.5-0.7 mm. long, evenly tuberculate with domical tubercles. Fig 6G (Isotype of *D. gracillima*).

Arizona to Colorado, U.S.A., south to southern Mexico, and in Baja California.

Toward the northern end of its range, the specimens belonging to the typical variety show frequent, but inconsistent, tendencies toward more obtuse, often cucullate, outer sepals and more pronouncedly coiled and contorted leaves. In the northern material the outer sepals are more frequently shorter than the inner, while the converse condition is more frequent toward the south. Although there is not enough material to justify any rigid hypothesis, I would guess that clinal variation is at work in this complex variety.

19b. *DRYMARIA LEPTOPHYLLA* var. *cognata* (S. F. Blake) J. Duke comb. & stat. nov.

*Drymaria cognata* S. F. Blake, in Journ. Wash. Acad. 14:285. 1924. (HOLOTYPE: *Palmer 912*, vicinity of Durango, Durango, US!)



Upright, diffusely branching, locally glandular-puberulent annual to as much as 15 cm. high. Leaves opposite, the blades 6–20 mm. long, 0.5–1.5 mm. broad, glabrous, lance-linear, apically acute, gradually tapering to the sessile somewhat clasping base, veinless or obscurely 3-nerved; stipules mostly entire, acicular, 0.5–0.8 mm. long. Inflorescences of several-flowered, diffuse, trichotomous cymes, the axes locally glandular-puberulent; bracts lance-ovate to ovate, aristate, scariosa save for the green excurrent midrib, 1–2 mm. long, usually shorter than the subtended pedicels, the pedicels 0.5–4.0 mm. long. Sepals 5, 3.3–4.5 mm. long, 0.8–1.3 mm. broad, glabrous or very sparsely glandular, lance-ovate, apically attenuate, 3-ribbed, transparent save for the green ribbed area; petals 5, 3.0–3.5 mm. long, bifid slightly more than half their length, the sinus broad, the lobes narrowly oblong, obtuse, the trunk flaring before tapering rather abruptly to the claw; stamens 5, 2.0–2.5 mm. long, the oblong anthers ca. 0.5 mm. long; ovary at anthesis subglobose, the style slightly shorter, trifid about half its length, slightly exceeding the anthers. Capsule ellipsoid, 2–3 mm. long, ca. 5-seeded, the seeds cochleate, ca. 0.8 mm. broad, minutely and regularly tuberculate. Fig. 6D (Holotype).

Durango and Chihuahua, Mexico.

19c. *DRYMARIA LEPTOPHYLLA* var. *nodosa* (Engelm.) J. Duke comb. nov.

*Drymaria nodosa* Engelm. in A. Gray, Pl. Fendl. 12. 1849. (HOLOTYPE: Plants grown from seed collected by Wislizenus in the mountains near Cosiquiriachi, MO!)

*Drymaria tenella* var. *nodosa* (Engelm.) Wiggins, in Proc. Cal. Acad. 4<sup>25</sup>:205. 1944.

*Drymaria gentryi* Fosberg, in Proc. Biol. Soc. Wash. 62:147. 1949. (HOLOTYPE: *Gentry* 2669; transition pine slope, los Cascarones, Río Mayo; Chihuahua; US!; isotypes at MO, UC, etc.)

Erect delicate, sparsely branched annuals (or perennials?) to as much as 25 cm. high, the internodes mostly longer than the leaves, usually glandular-puberulent, the taproot to 2 mm. in diameter. Basal leaves spatulate to orbicular, opposite or pseudovercillate, caducous; cauline leaves opposite, glabrous or minutely glandular, 5–30 mm. long, 0.5–2.5 mm. broad, 1-nerved, linear to narrowly elliptic, apically obtuse to apiculate, sessile; stipules entire, acicular, caducous, 0.5–1.5 mm. long. Inflorescences of terminal many-flowered dichasial cymes, the peduncles 2–5 cm. long, stipitate-glandular; bracts lance-deltoid to ovate, acuminate, 0.7–2.5 mm. long, mostly shorter than the pedicels, the pedicels stipitate-glandular, 0.5–5.0 mm. long. Sepals 5, subequal, 2.3–3.5 mm. long, 0.5–1.5 mm. broad, lanceolate to ovate, acuminate, basally or entirely stipitate-glandular, 3-ribbed, the ribs distally confluent; petals 5, 2.0–3.5 mm. long, bifid slightly more than half their length, the lobes linear to oblong or narrowly spatulate, obtuse, mostly 1-nerved, exappendiculate; stamens 5, 1.5–2.5 mm. long, the oblong anthers ca. 0.4 mm. long, the filaments basally connate, often with inconspicuous staminodial flaps; ovary at anthesis ellipsoid to subglobose, the styles elongate, nearly as long as the ovary, bifid or trifid less than half their length, equaling or exceeding the anthers. Capsule ellipsoid, 1.5–2.0 mm. long, shorter than the sepals, 1–9-seeded, the seeds cochleate, the anterior end strongly recurved, minutely and regularly reticulate, 0.6–1.0 mm. broad. Fig. 6E (Holotype of *D. nodosa*), Fig. 6F (Holotype of *D. gentryi*).

Chihuahua, Sonora, Durango, San Luis Potosi and Hidalgo, Mexico.

*Gentry 2669*, type of *D. gentryi*, stands out with its rather broad leaves, but examination of other specimens e.g. *LeSueur 623*, also from Chihuahua, shows that Fosberg's species cannot stand as distinct from *D. leptophylla* var. *nodosa*.

Equally aberrant are *S. S. White 4185* and *4776* from Sonora. In these specimens, the inflorescence is strikingly congested and the petal-lobes are broader than those of most specimens of the variety *nodosa*. In spite of the bizarre inflorescence, it seems best to retain them within the variety, with which they coincide in other fundamental characteristics.

#### I. Series TENUIS

Leaves opposite, lanceolate, petiolate, stipulate, the stipules mostly lacerate. Flowers in monopodial or dichasial cymes, the pedicels longer or shorter than the bracts. Sepals acute, 1-3-nerved. Petals bifid, the lobes 1-5-nerved, unguiculate, exauriculate. Stamens 2-5. Seeds cochleate, tuberculate, the tubercles not ornate. Two diffusely spreading annual or perennial Mexican species. Fig. 7.

- a. Sepals 3-ribbed, stipitate-glandular; ultimate branches of the cymes monopodial; petioles 0.5-1.5 mm. long.....20. *D. ANOMALA*  
 a. Sepals 1-ribbed, glabrous or with sessile glands; cymes predominantly dichasial; petioles 1-6 mm. long.....21. *D. TENUIS*

20. *DRYMARIA ANOMALA* S. Watson, in Proc. Am. Acad. 25:143. 1889. (HOLOTYPE: *Pringle 2847*, Carneros Pass, Coahuila, US!; isotype at GH)

Upright or spreading annuals or perennials, much branched from below, the internodes mostly longer than the leaves, stipitate-glandular, the taproot to 5 mm. thick. Cauline leaves opposite, 3-8 mm. long, 2-4 mm broad, glabrous to glandular or puberulent, the blades lance-elliptic, obscurely veined, apically acute, basally cuneate to acute, the petioles mostly less than 1 mm. long; stipules entire or bifid, lance-deltoid to acicular, persistent, 0.5-1.5 mm. long. Inflorescences of terminal many-flowered cymes, the first branches dichasial, subsequent branches becoming monopodial; peduncles 2-5 cm. long, glabrous to stipitate-glandular; bracts 0.5-2.0 mm. long, exceeding the pedicels, the pedicels stipitate-glandular or glabrescent. Sepals 5, 2-3 mm. long, 1.0-1.5 mm. broad, stipitate-glandular, broadly elliptic, apically acute, with 3 prominent veins, the outer submarginal, there being little or no scarious margin; petals 5, 1.5-2.0 mm. long, bifid a little over half their length, the lobes oblong, obtuse; stamens (2-) 3-5, 1.0-1.4 mm. long, the anthers oblong, ca. 0.3 mm. long; ovary at anthesis obturbinate, the style trifid about half its length, much shorter than the ovary, about attaining the anthers. Capsule about equaling the sepals, 5-9-seeded, the seeds cochleate, closely tuberculate, 0.6-0.9 mm. broad. Fig. 7A (details from Holotype).

Coahuila, Zacatecas, San Luis Potosi and Hidalgo, Mexico.

21. *DRYMARIA TENUIS* S. Watson, in Proc. Am. Acad. 25:142. 1889. (HOLOTYPE: *Pringle 2120*; under ledges of the barranca near Guadalajara, Jalisco, US!; isotype at GH)

*Drymaria filiformis* Robinson & Seaton, in Proc. Am. Acad. 28:117. 1893. not Benth. 1863. (HOLOTYPE: Seaton 267; barren slopes, Mt. Orizaba, 9000 ft. GH!; isotypes at US, MO, NY, etc.)

*Drymaria tenuis* a var. *genuina* Briq. in Ann. Cons. & Jard. Bot. Gen. 13:374. 1911.

*Drymaria tenuis*  $\beta$  var. *jalisca* Briq. loc. cit. 374. 1911. (HOLOTYPE: Pringle 4536; Civitas Jalisco, in declivibus altis prope Guadalajara, G; n. v.; isotypes at MO, US, etc.!) )

Erect or clambering delicate annuals or perennials to as much as 50 cm. long, the internodes much longer than the leaves, glabrous or pilosulous, the root sometimes lignescent, to as much as 6 mm. thick. Leaves opposite, glabrous, glandular or pilosulous, the blades lance-elliptic to ovate, apically and basally acute, 2.5–10.0 mm. long, 1–7 mm. broad, the petioles 0.5–5.0 mm. long; stipules lacerate, the divisions acicular, 0.5–2.0 mm. long. Inflorescences of terminal dichasial cymes, the peduncles very elongate, glabrous; bracts ovate, scariose, 1–2 mm. long, the



Fig. 7: A. *D. anomala* (details from holotype); inflorescence, 1 $\times$ ; flower, 10 $\times$ ; petal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 15 $\times$ . B. *D. tenuis* (holotype of *D. filiformis*); petal, 10 $\times$ ; sepal, 10 $\times$ ; stamen, 10 $\times$ ; seed, 22 $\frac{1}{2}\times$ . C. *D. tenuis* (holotype); inflorescence,  $\frac{1}{4}\times$ ; flower and pedicels, 15 $\times$ ; petal, 20 $\times$ .

pedicels 2-7 mm. long, glabrous, usually much longer than the subtending bracts. Sepals 5, the outer ovate, apically obtuse, 2.0-2.5 mm. long, ca. 1 mm. broad, the one rib occasionally excurrent; inner sepals narrowly ovate to ovate, 2.5-3.0 mm. long; petals 5, 1-2 mm. long, bifid about two-thirds their length, the lobes oblong, apically obtuse or acutish, exappendiculate, gradually tapering to the linear claw; stamens 5, 1.0-1.3 mm. long, the oblong anthers ca. 0.2 mm. long, the filaments basally connate; ovary at anthesis subglobose, ca. 0.8 mm. long; style bifid or trifid about half its length, about attaining the anthers. Capsule ovoid, about equaling the sepals, 5-15-seeded, the seeds cochleate, 0.5-0.7 mm. broad, evenly tuberculate, the dorsal tubercles mostly longer than broad. Fig. 7B (Holotype of *D. filiformis* Robinson & Seaton); Fig. 7C (Holotype of *D. tenuis*).

Michoacan, Jalisco, Guanajuato, Zacatecas and Veracruz, Mexico.

The type of *D. filiformis* from Mt. Orizaba differs only in having shorter petioles and smaller, more obtuse petal lobes, differences possibly resulting from the alpine environment and probably of no taxonomic consequence. Unfortunately Briquet relied too heavily on Watson's description of *D. tenuis* as glabrous, and published the variety *jalicana*, believing it to differ in being pubescent. Examination of the holotype of *D. tenuis* reveals that Watson's description was erroneous; the type is locally villosulous with hairs up to 0.5 mm. long. Briquet's pubescent variety, collected very near the type locality of the typical variety, is probably no more pubescent than the typical variety.

#### J. Series FRUTESCENTES

Leaves linear to lanceolate, opposite, occasionally pergameneous, sessile or briefly petiolate, stipulate or estipulate. Flowers, showing tendencies toward monoecism, in dichasial bracteate cymes. Sepals acute, 3-5-ribbed. Petals bifid, the lobes 3-9-nerved, exauriculate, unguiculate or exunguiculate, the trunk entire or denticulate. Sepals cochleate, tuberculate, the tubercles acute or obtuse. Four more or less erect suffrutescent perennial species of Peru and Ecuador. Fig. 8.

- a. Leaves neither imbricate nor pungent; pedicels and sepals often glandular, the sepals 3-4-nerved; petals not tapered to the claw.
- b. Pedicels and sepals usually glandular, the midrib of the sepals not excurrent; seeds with domical or conical tubercles; stipules present or absent. Peru and Ecuador.
- c. Leaves stipulate; trunk of the petals conspicuously constricted at the commissure with the lobes, the claw shorter than the trunk; seeds with acute conical tubercles. Ecuador.....22. *D. STELLARIOIDES*
- c. Leaves often estipulate; trunk of the petals more or less continuous with the lobes, the claw occasionally longer than the trunk; seeds with blunt, domical tubercles. Peru.....23. *D. STEREOPHYLLA*
- b. Pedicels and sepals glabrous, the midrib of the sepals excurrent; seeds with domical tubercles; stipules present. Peru.....24. *D. AURICULIPETALA*
- a. Leaves imbricate, pungently acute; pedicels and sepals glabrous, the sepals mostly 5-nerved; petals tapered to the claw. Peru.....25. *D. FRUTESCENS*

22. *DRYMARIA STELLARIOIDES* Humb. & Bonpl. ex Roem. & Schult. Syst. Veg. 5: 406. 1819. (HOLOTYPE: *Humb. & Bonpl. s. n.*; crescit prope Hambato, alt. 1380 hex. [Regno Quitensi]; probably destroyed; fragment and photograph at F! illustr. HBK. Nov. Gen. & Sp. 6; pl. 516. 1823.)



Fig. 8: A. *D. stellarioides*; petal,  $3\times$ ; sepal,  $3\times$ ; seed,  $15\times$ ; upper portion of plant,  $\frac{1}{2}\times$ . B. *D. stereophylla* var. *stereophylla* (isotype); petal,  $4\times$ ; sepal,  $4\times$ ; seed,  $15\times$ . C. *D. stereophylla* var. *exstipulata* (isotype); petal,  $4\frac{1}{2}\times$ ; sepal,  $4\frac{1}{2}\times$ ; seed,  $12\frac{1}{2}\times$ . D. *D. auriculipetala* (holotype); petal,  $4\times$ ; sepals,  $4\times$ ; stamen,  $5\times$ ; seed,  $7\frac{1}{2}\times$ . E. *D. frutescens* (isotype); habit,  $\frac{2}{3}\times$ ; petal,  $4\frac{1}{2}\times$ ; sepal,  $4\frac{1}{2}\times$ ; stamen,  $4\frac{1}{2}\times$ .

Upright or ascending dichotomous lignescent perennials from a stout taproot to 15 mm. thick, the internodes mostly longer than the leaves except on condensed lateral branches, glabrous to glandular-pubescent. Leaves opposite, glabrous or rarely glandular-puberulent, lanceolate to oblanceolate, apically acute, marginally entire, 3-ribbed, 5-20 mm. long, 2.5-7.5 mm. broad, tapered to the sessile, clasping base; stipules entire, apparently fused or occasionally absent, 0.0-2.5 mm. long. Inflorescences of lax to crowded 5-many-flowered cymes, the peduncles 1-8 cm. long; bracts lanceolate, 3-5 mm. long, intergrading with the foliage leaves; pedicels glabrous to densely glandular-puberulent, all but the central pedicel usually exceeded by the bracts. Sepals 5, narrowly to broadly lanceolate, glabrous to densely glandular-puberulent, strongly 3-ribbed, apically acute, (4-) 5-9 mm. long, 2-3 mm. broad; petals 5, 5-10 mm. long, bifid about half their length, the lobes oblong, obtuse, 4-8-nerved, exauriculate, constricted slightly toward the trunk, the trunk rhombic to rectangular, truncate to the short claw; stamens 5, 3-6 mm. long, those of fertile flowers (destined to mature seeds) usually much shorter than those of infertile flowers; anthers 0.7-1.1 mm. long; filaments basally connate into a cup ca. 1 mm. deep; ovary (occasionally absent in flowers with long stamens) ellipsoid, multiovulate, those of fertile flowers about equaling the anthers; styles 1.5-3.0 mm. long, trifid for about one-fourth their length. Capsule ellipsoid, substylopodiate, 3-5 mm. long, 2-many-seeded, the seeds laxly circinnate, 0.8-1.2 mm. broad, tuberculate, the dorsal tubercles subspinulose, the facial tubercles tending to be polygonal. Fig. 8A.

Ecuador.

*Pachano* 95 (Fig. 8A) and the isotype seem to differ from other representatives of this species in that the sepals and petals are unusually long and the petal lobes have more numerous veins. Seeds of this species, as illustrated in HBK. Nov. Gen. & Sp. 6: *pl.* 516. 1823, appear to be constantly subspinulose-tuberculate. There is no indication in the aforementioned illustration however of the polygamous tendency which I believe characterizes this species. Although the material available for dissection has not been too copious, I feel that certain correlates exist in different types of flowers. Many of the ovaries bear aberrant ovules and in some flowers the ovary is completely lacking. In flowers which mature seed, the anthers rarely surpass the body of the capsule, while in those flowers with aberrant ovules, the filaments seem to have elongated so that the anthers equal or surpass the style branches. In some unnumbered specimens collected by Jameson near Cuenca and Loxa, there are flowers with long glandular sepals and others with shorter glabrous sepals; those with the shorter glabrous sepals proved to be fertile while some of those with longer glandular sepals were completely devoid of ovaries.

23. *DRYMARIA STEREOPHYLLA* Mattf. in Notizbl. Bot. Gart. Berl. 13:436. 1936. (HOLOTYPE: *Raimondi* 2502; Peru. Dep. Junin: Prov. Jauja; Abhang am Fusse des Chacapalpa zwischen Huari und Jauja, B, n. v.; probably destroyed)

*Drymaria stereophylla* Mattf. ex MacBride, in Field Mus. Bot. 13<sup>2</sup>:626. 1937. (HOLOTYPE: *MacBride* 962; Junin; in crevices of limestone cliffs, 4000 m., La Oroya, Peru; F!; isotype at US)



*Drymaria stereophylla* var. *exstipulata* Mattf. in Notizbl. Bot. Gart. Berl. 13:437. 1936. (HOLOTYPE: Weberbauer 6600; Peru; Dep. Junin; nordöstlich von Huancayo unterhalb der Hacienda Acopalca, geogr. Br. 12° 5' S., an Felsen, 3600–3700 m ü. M.; B. n. v.; isotypes at F, MO, US!)

Laxly spreading or ascending lignescent perennials to as much as 35 cm. tall, the internodes shorter to longer than the leaves, glandular-puberulent, the taproot to as much as 1 cm. thick. Leaves opposite, 4–12 mm. long, 2–6 mm. broad, glandular-puberulent, broadly lanceolate to narrowly ovate, apically acute to aristately acuminate, subsessile, the brief petioles clasping; stipules entire, lance-linear, caducous, 0.5–1.0 mm. long, absent in the variety. Inflorescences of lax occasionally congested terminal 3–many-flowered cymes, the peduncles 1–6 cm. long; bracts lanceolate to lance-ovate, 3–5 mm. long, the pedicels 2–10 mm. long, stipitate-glandular. Sepals 5, 5.0–7.5 mm. long, 2.0–4.5 mm. broad, glandular, ovate, 3–4-nerved, the midrib not excurrent, the outer acute, the inner obtuse; petals 5, 5–9 mm. long, deeply bifid, the lobes oblong, obtuse, 5–8-nerved, exappending, not constricted at the junction with the trunk, the trunk truncate to the claw; the claw minute, or, in the variety, as long as the trunk; stamens 5, 4–6 mm. long, the oblong anthers ca. 1 mm. long, the filaments basally connate forming a cup about 1 mm. deep; ovary at anthesis turbinate to ellipsoid, the style 1.0–2.5 mm. long, bifid or trifid about one-third its length. Capsule ovoid, 2.5–3.5 mm. long, 4–27-seeded, the seeds loosely circinnate, 0.9–1.3 mm. broad, tuberculate, the tubercles low and contiguous. Fig. 8B (Isotype of var. *stereophylla*); Fig. 8C (Isotype of var. *exstipulata*).

Departments Junin, Cuzco and Lima, Peru.

Mattfield commented on the homogeneity of the specimens which he cited in the original description of *D. stereophylla* var. *exstipulata*. Material collected subsequently has further substantiated the differences in the varieties and other differences have been uncovered. The shape of the petals, frequent telescoping of the internodes, and the absence of stipules in the var. *exstipulata* are characteristics which point toward the bizarre *D. frutescens*. The two varieties of *D. stereophylla* may be keyed as follows:

- a. Stipules present, the leaves rigid, glabrous or with a few sessile glands; trunk of the petals much longer than the claw, the claw occasionally not even apparent.....var. STEREOPHYLLA
- a. Stipules absent, the leaves not rigid, plants often densely stipitate-glandular; claw of the petals about as long as the trunk, obvious.....var. EXSTIPULATA

24. *DRYMARIA AURICULIPETALA* Mattf. in Notizbl. Bot. Gart. Berl. 13:439. 1936. (HOLOTYPE: MacBride & Featherstone 2264; Peru; Llata, von Felsbändern herabhängend, ca. 2100 m ü. M.; F!; isotypes at GH, MO, US)

Upright or ascending glabrous suffruticose annuals or perennials to as much as 60 cm. long. Leaves opposite, glabrous, 5–15 mm. long, 1.5–3.0 mm. broad, the blades narrowly lanceolate, slightly falcate, apically attenuate, aristate, basally clasping, the stipules entire, acicular, tardily deciduous, 1.0–1.5 mm. long. Inflorescences of lax terminal 1–7-flowered cymes, the glabrous peduncles 5–40 mm. long; bracts broadly ovate, strongly 1-ribbed, 2.5–3.5 mm. long, exceeding the pedicels. Sepals 5, subequal, 7–8 mm. long, 2–3 mm. broad, glabrous or minutely glandular,

lanceolate, apically attenuate and aristate, basally unguiculate or umbonulate, only the midrib conspicuous; petals 5, 6.5–7.5 mm. long, bifid about half their length, the lobes broadly oblong, apically rounded, 1.0–1.3 mm. broad, 4–6-nerved, exapendiculate, hardly constricted at the junction with the trunk, the trunk 1.2–1.6 mm. broad, the claw minute; stamens 5, ca. 5.5 mm. long, the oblong anthers ca. 0.8 mm. long, often somewhat twisted; ovary at anthesis obovoid, slightly exceeded by the anthers, the style trifid about half its length, about equaling the anthers. Capsule ca. 4 mm. long, many-seeded, the seeds cochleate, ca. 1 mm. broad, dorsally flattened or sulcate, tuberculate, the tubercles low and contiguous. Fig. 8D (Holotype).

Known only from the type locality; Llata, Peru.

25. *DRYMARIA FRUTESCENS* Mattf. in Notizbl. Bot. Gart. Berl. 13:439. 1936. (HOLOTYPE: *Weberbauer 7203*; Peru; Dep. Libertad, Prov. Santiago de Chuco, über der Hacienda Angasmarca; Grassy steppe mit zahlreichen eingestreuten Sträuchern, an felsigen Abhängen, 3650 m ü. M.; B, n. v.; isotypes at F, US!)

Ascending frutescent glabrous perennials to 30 cm. tall, the leaves closely appressed to the stems. Leaves 2–6 mm. long, 1.0–1.5 mm. broad, imbricate in two ranks, lance-ovate, apically aristate-acuminate, basally clasping, 3-ribbed, marginally transparent; stipules entire, narrowly lance-deltoid, ca. 0.5 mm. long. Flowers solitary at the ends of the branches, the bracts similar to the foliage leaves, the glabrous pedicels 2–3 mm. long. Sepals 5, subequal, 5.5–7.0 mm. long, 1.5–2.0 mm. broad, glabrous concavo-convex, ovate, apically acute or shortly acuminate, transparent save for the 7 nerves; petals 5, 5–7 mm. long, bifid for about two-thirds their length, the lobes oblong to spatulate, obtuse or emarginate, exapendiculate, the trunk and claw merging almost imperceptibly; stamens 5, 2.5–4.5 mm. long, the oblong anthers ca. 0.8 mm. long, often spirally contorted in drying; ovary at anthesis ellipsoid, exceeded by the anthers, the style trifid about half its length, about equaling the anthers. Capsule 2.5–3.0 mm. long; mature seeds not seen. Fig. 8E (Isotype).

Known only from the type locality in Dept. Libertad, Peru.

#### K. Series *FASCICULATAE*

Leaves opposite, linear-elliptic to narrowly ovate, subsessile, stipulate, the stipules entire or bifid. Flowers in rather dense bracteate cymes, the bracts often stipulate. Sepals acute, 1–3-nerved. Petals bifid, the lobes 1–3-nerved, exauriculate, the claw minute or completely absent (except in *D. praecox*), the trunk as wide as the combined width of the lobes. Stamens 3–5. Seeds loosely or tightly cochleate, tuberculate. Three species in Peru, two rather delicate and minute annuals and the more or less suffrutescent *D. fasciculata*. Fig. 9.

- a. Plants upright, often suffrutescent; sepals 5–8 mm. long; leaves mostly larger than 6 mm. long and 4 mm. broad; bracts not stipulate.....26. *D. FASCICULATA*  
 a. Minute depressed or ascending annuals; sepals 2.0–4.5 mm. long, glabrous, glandular or villosulous; leaves mostly less than 6 mm. long and 4 mm. broad; bracts often stipulate:

- b. Sepals acuminate, glabrous, apically reflexed in age; herbage occasionally glandular but not villose. Dept. Lima, Huancavelica and Puno: Peru.....27b. *D. ENGLERIANA* var. *DEVIA*
- b. Sepals acute, stipitate-glandular, occasionally apically inflexed; herbage villose or villosulous. Dept. Ancash and Cuzco; Peru:
- c. Petals with a broad trunk, not tapered to a claw, the lobes 1-3-nerved; pedicels of the central flowers about as long as their bracts. Dept. Ancash.....
- .....27a. *D. ENGLERIANA* var. *ENGLERIANA*
- c. Petals gradually tapered to a definite claw, the lobes 2-4-nerved; pedicels of the central flowers much longer than their bracts. Dept. Cuzco.....28. *D. PRAECOX*

26. *DRYMARIA FASCICULATA* A. Gray, Bot. U. S. Expl. Exped. 125. 1854. (HOLOTYPE: *Wilkes exped. s. n.*; Andes of Peru, near Obrajillo, US!)

Upright dichotomous, paucifoliate annuals to as much as 25 cm. high, subglabrous except for the glandular axes of the inflorescence, the taproot to as much as 3 mm. broad. Leaves opposite, the blades 8-18 mm. long, 4-10 mm. broad, ovate (the lowermost occasionally spatulate), apically acute or acuminate, marginally somewhat undulate, basally clasping, only the midrib obvious, the stipules entire, linear-lanceolate, caducous, ca. 1 mm. long. Inflorescences of terminal fasciculate, strongly dichotomous, 3-many-flowered cymes, the glabrous to densely glandular peduncles 2-6 cm. long, the bracts lanceolate to ovate, acute or mucronate, transparent save for the midrib, 4-6 mm. long, 2-4 mm. broad, obscuring the short pedicels. Sepals 5, subequal, 4-7 mm. long, 1.0-1.8 mm. broad, lance-oblong to narrowly elliptic, acuminate, rather strongly 3-ribbed, often with a scarioso margin; petals 5, 2.5-7.0 mm. long, bifid about half their length, the lobes oblong, apically rounded to emarginate, 2-3-nerved, their outer margins forming straight lines with the margins of the trunk, exappendiculate, the trunk exunguiculate or subexunguiculate; stamens 5, 2-6 mm. long, the oblong anthers 0.4-1.2 mm. long; ovary at anthesis subcylindric, slightly exceeded by the anthers, the barely trifid style slightly exceeding the anthers. Capsule narrowly ellipsoid, included, 3-4 mm. long, several-seeded, the seeds laxly circinnate, minutely and rather evenly tuberculate, the anterior end usually long and pointed. Fig. 9A (details from Holotype).

Andes of Peru.

27a. *DRYMARIA ENGLERIANA* var. *ENGLERIANA*

*Polycarpon englerianum* Muschler, in Bot. Jahrb. 45:452. 1911.

(HOLOTYPE: *Weberbauer 3101*; Peru; Ancash; Huaraz, 4300 m.; probably destroyed at B; isotypes at F, G!)

*Drymaria engleriana* (Muschler) Baehni & MacBride, in Field Mus. Bot. 13<sup>2</sup>:621. 1937.

Minute prostrate annuals to 5 cm. high, the internodes mostly longer than the leaves, hirsutulous. Leaves opposite, the blades 2-8 mm. long, 1.0-4.5 mm. broad, ovate, apically acute, marginally entire, basally attenuate to the alate clasping petioles, weakly 3-nerved, scantily hirsutulous, the stipules entire or bifid, the divisions filiform to lance-deltoid. Inflorescences of terminal, rather lax, several-flowered cymes, the axes hirsutulous, the bracts 1.5-3.0 mm. mostly longer than the pedicels. Sepals 5, 2.0-3.6 mm. long, 0.6-1.2 mm. broad, narrowly ovate, apically acute or briefly acuminate, often with sessile or stipitate glands, 3-ribbed, only the midrib prominent, the apex not reflexed, often inflexed; petals 5, 1.0-2.4 mm. long,

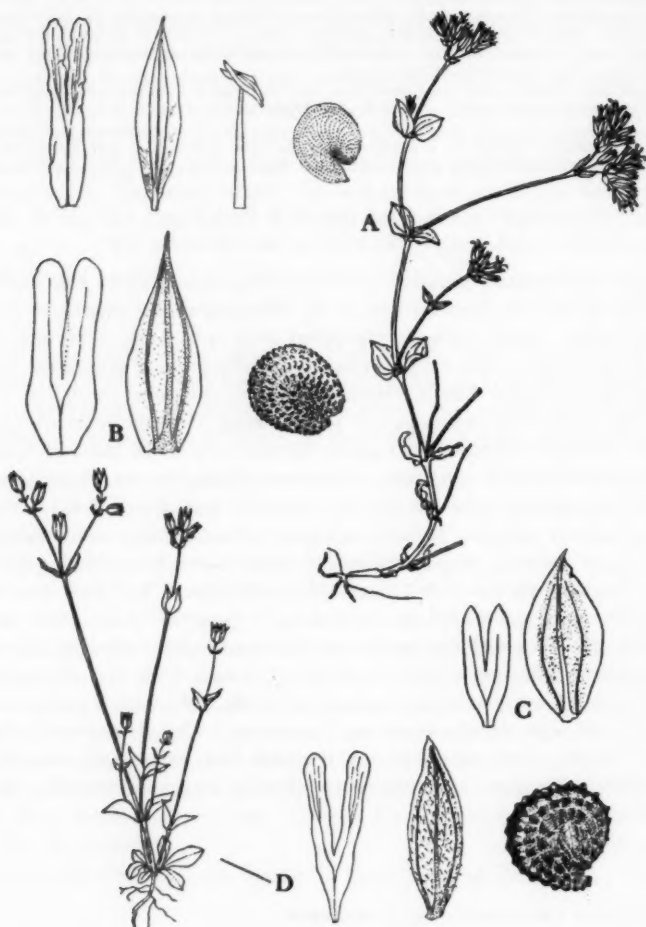


Fig. 9: A. *D. fasciculata* (details from holotype); petal, 4 $\times$ ; sepal, 4 $\times$ ; stamen, 7 $\frac{1}{2}$  $\times$ ; seed, 12 $\frac{1}{2}$  $\times$ ; habit,  $\frac{1}{2}$  $\times$ . B. *D. engleriana* var. *devia* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ . C. *D. engleriana* var. *engleriana* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ . D. *D. praecox* (holotype); habit, 1 $\times$ ; petal, 7 $\frac{1}{2}$  $\times$ ; sepal, 7 $\frac{1}{2}$  $\times$ ; seed, 17 $\frac{1}{2}$  $\times$ .

bifid about half their length, the lobes obtuse to acute, oblong, 1-nerved, the outer margin forming more or less a straight line with the margin of the trunk, the claw not apparent; stamens 3-5, 1.0-1.5 mm. long, the suborbicular to oblong anthers ca. 0.2 mm. long, the filaments basally connate into a minute carnosous column; ovary renoid, the style shorter than the ovary, ca. 0.5 mm. long, trifid about half its length. Capsule globose to ellipsoid, included, 1.5-2.0 mm. long, 2-8-seeded, the seeds laxly circinnate, minutely and evenly tuberculate, 0.7-0.9 mm. broad. Fig. 9C (Isotype).

High altitudes, Dept. Ancash, Peru.

Although Baehni and MacBride (in Field Mus. Bot. 13<sup>2</sup>:621. 1937) correctly transferred this species to *Drymaria* from *Polycarpon*, MacBride (p. 627) also retains it as a species of *Polycarpon*, curiously stating that it is "probably only a densely cespitose form of *P. apurense*."

27b. *DRYMARIA ENGLERIANA* var. *devia* (Baehni & MacBride) J. Duke comb. & stat. nov.

*Drymaria devia* Baehni & MacBride, in Field Mus. Bot. 13<sup>2</sup>:620. 1937. (HOLOTYPE: Pennell 14655; Lima; open rocky slopes near Canta, 4000 m., F!)

Delicate prostrate or ascending subglabrous annuals usually less than 5 cm. tall, branching mostly from the base. Leaves opposite, the blades 2.5-5.0 mm. long, 2-3 mm. broad, subcoriaceous, ovate, occasionally glandular, apically acute or attenuate and apiculate, basally clasping, the uppermost rather strongly 3-ribbed; stipules entire or bifid, the divisions narrowly lance-deltoid, ca. 1 mm. long. Inflorescences of dense terminal 1-11-flowered cymes, the glabrous peduncles 4-8 mm. long, the bracts 2-3 mm. long, ca. 1 mm. broad, ovate, aristate-acuminate, the midrib often cyanic; pedicels mostly less than 1 mm. long, concealed by the bracts. Sepals 5, 4.0-4.5 mm. long, 1.5-2.0 mm. broad, narrowly ovate, aristate-acuminate, strongly 3-ribbed, glabrous to minutely glandular, transparent save for the ribs; petals 5, 2.5-3.0 mm. long, bifid about half their length, the lobes oblong, obtuse, 1-nerved, curving outwardly to the inflated trunk, the trunk ca. 1.2 mm. broad, exappendiculate, the claw not apparent; stamens 5, ca. 2.2 mm. long, the oblong anthers ca. 0.4 mm. long; ovary at anthesis slightly exceeding the anthers, the style trifid about half its length. Capsule 2.5-3.0 mm. long, ca. 8-seeded, the seeds dorsally flattened, minutely tuberculate, ca. 0.6 mm. broad, dark brown. Fig. 9B (Holotype).

At high altitudes in Depts. Lima, Puno and Huancavelica, Peru.

This diminutive variety is closely related to the preceding and seems sufficiently distinct to warrant varietal recognition. The acuminate often reflexed, strongly ribbed sepals and the lack of jointed hairs seem to characterize the few specimens of the variety examined.

28. *DRYMARIA PRAECOX* Baehni & MacBride, in Field Mus. Bot. 13<sup>2</sup>:625. 1937. (HOLOTYPE: Weberbauer 6916; between Pisac & Paucartambo, prov. Paucartambo, Dept. Cuzco, 4100 m., Peru, F!; isotypes at MO, US, etc.)

Delicate, virgate, glandular-puberulent annuals to as much as 5 cm. high, with few nodes below the inflorescence, the basal rosette often persistent. Basal leaves

spatulate; cauline leaves opposite, the blades 2–4 mm. long, 1.5–3.0 mm. broad; villosulous, ovate, apically acute, basally clasping, obscurely trinerved, the stipules entire, acicular, 0.5–0.8 mm. long. Inflorescences of diffuse 1–9-flowered cymes, the axes densely glandular-puberulent; bracts ovate to lanceolate, stipitate, 1-ribbed, the rib often excurrent, 1.0–1.5 mm. long, the pedicels usually much longer. Sepals 5, 2.5–3.5 mm. long, 1.0–1.4 mm. broad, glandular-pubescent, narrowly ovate, apically acute or obtuse, often inflexed, 3-ribbed, transparent save for the ribs; petals 5, ca. 3 mm. long, bifid half their length or more, the lobes oblong, obtuse, exappendiculate, 3-nerved, gradually tapering to the base, the trunk and claw not discernibly differentiated; stamens 5, 1.2–1.5 mm. long, the suborbicular anthers ca. 0.3 mm. long; ovary at anthesis compressed-globose, exceeded by the anthers, about as long as the style; style trifid about half its length, slightly exceeding the anthers. Capsule included, ca. 2.2 mm. long, ca. 5-seeded, the seeds cochleate, ca. 0.7 mm. broad, tuberculate, the tubercles rather prominent, nearly contiguous. Fig. 9D (Holotype).

Known only from the type collection from Cuzco, Peru.

Perhaps a misfit in this series, this species may be of hybrid origin, and in some respects it recalls *D. glandulosa* var. *galeottiana*, perhaps also of hybrid origin.

#### L. Series DEBILES

29. *DRYMARIA DEBILIS* Brandege, in Proc. Cal. Acad. 2<sup>2</sup>:131. 1889. (HOLOTYPE: Brandege s. n.; Purisima, Feb. 13, 1889; UC!)

*Drymaria polystachya* Brandege, in Zoe 2:70. 1891. (HOLOTYPE: Brandege 35; cliffs near San José del Cabo, Baja California; UC!; isotypes at D, US, etc.)

*Drymaria diffusa* J. N. Rose, in Contr. U. S. Nat. Herb. 1:130. pl. 12. 1892. (HOLOTYPE: Palmer 819; Carmen Island; US!; isotypes at F, MO, US, NY, etc.)

*Drymaria polystachya* var. *diffusa* (Rose) Wiggins, in Proc. Cal. Acad. 4<sup>25</sup>:198. 1944.

Ascending or clambering, occasionally subscandent annuals or perennials, the tenuous, villose or glandular internodes shorter to longer than the leaves, the taproot to as much as 15 mm. thick. Leaves opposite, the blades 3–20 mm. long, 3–20 mm. broad, villose or glandular, broadly ovate to reniform, apically acutish and apiculate, basally cordate, often drying with a yellowish tinge, the petioles nearly as long as the blades, the stipules mostly entire, filiform, 1–3 mm. long. Inflorescences of terminal lax 3–many-flowered cymes, the axes villose or glandular puberulent, the peduncles 1–10 mm. long; bracts narrowly to broadly ovate, scarious, 1.5–2.5 mm. long, much exceeded by the pedicels, the villose or glandular pedicels to as much as 25 mm. long. Sepals 5, 2.5–3.5 mm. long, 1.5–2.4 mm. broad, glandular to villose, oblong to elliptic or ovate, apically obtuse, emarginate or with the midrib occasionally excurrent, the venation obscurely dichotomous and reticulate; petals 5, 3.0–6.5 mm. long, bifid about half their length, the lobes oblong, rounded to truncate at the apex, 1–2-nerved, gradually tapered to the claw; stamens 5, 1.0–3.5 mm. long, the filaments usually dimorphic, two or three being distinctly longer than the others, the anthers oblong 0.5–1.0 mm. long; ovary at anthesis ellipsoid, often stipitate, exceeded by the anthers, the style 1–2 mm. long, trifid to half its length. Capsule ellipsoid to ovoid, 1.0–3.5 mm. long, 6–



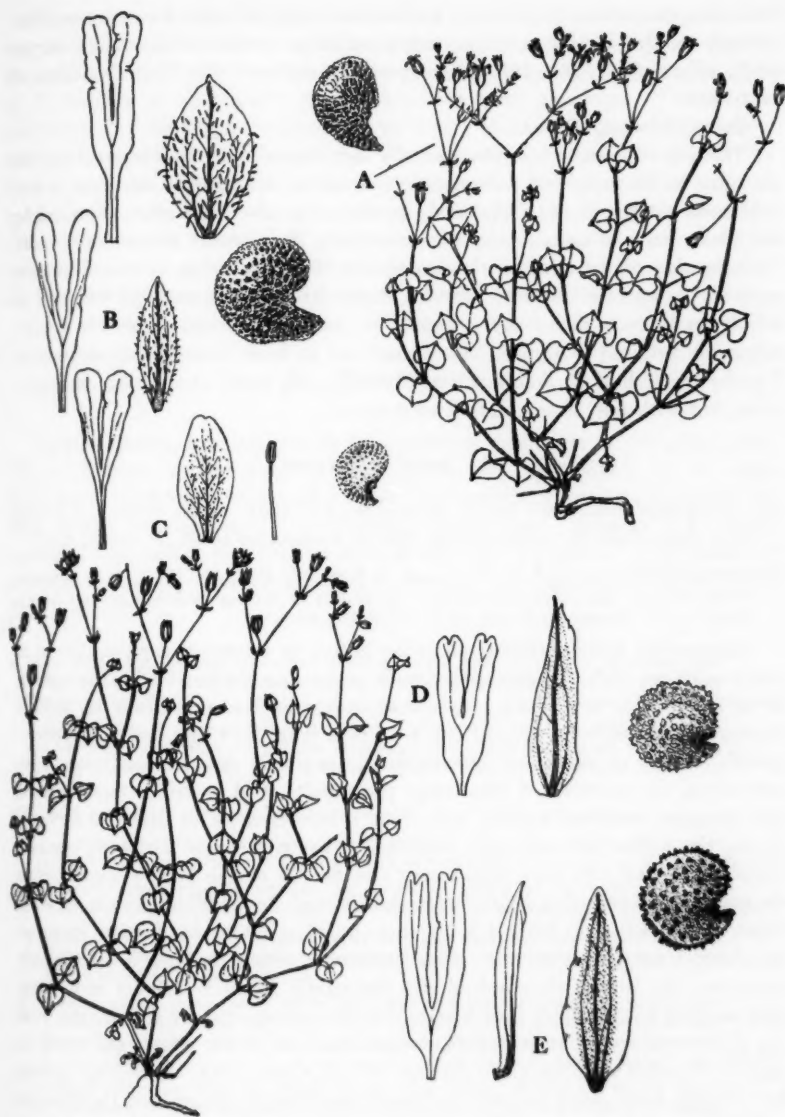


Fig. 10: A. *D. debilis* (holotype of *D. polystachya*); petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed,  $20\times$ ; habit,  $\frac{1}{2}\times$ . B. *D. debilis* (holotype of *D. diffusa*); petal,  $6\times$ ; sepal,  $6\times$ ; seed,  $20\times$ . C. *D. debilis* (holotype); petal,  $5\times$ ; sepal,  $5\times$ ; stamen,  $5\times$ ; seed,  $10\times$ . D. *D. laxiflora* (isotype of *D. chibabuenensis*); habit,  $\frac{1}{2}\times$ ; petal,  $6\times$ ; sepal,  $6\times$ ; seed,  $20\times$ . E. *D. laxiflora* (isotype); petal,  $5\times$ ; sepals,  $5\times$ ; seed,  $20\times$ .

15-seeded, the seeds ampulliform, 0.6–1.0 mm. broad, the pointed anterior ends not strongly recoiled, the tubercles low, polygonal, rather remote. Fig. 10A (Holotype of *D. polystachya*); Fig. 10B (Holotype of *D. diffusa*); Fig. 10C (Holotype of *D. debilis*).

Baja California, Mexico.

This polymorphic species has generally been regarded as three separate species, the more or less sympatric differences purported to reside in the duration, pubescence, and the length and shape of the sepals and petals. I am more impressed by the homogeneity of certain other characters (e.g. the peculiar retort-shaped seeds, the inequality of the stamens, the venation of the sepals) than by the differences supposed to separate the three species. Particularly suspicious to me are keys in which the primary dichotomy is annual vs. perennial. Many *Drymaria* species, originally described as annual, have turned out to have perennial representatives. I prefer to think of *D. debilis* as a species embracing many contrasting characteristics, but with few, if any, correlated contrasts.

#### M. Series LAXIFLORES

30. *DRYMARIA LAXIFLORA* Benth. Pl. Hartw. 73. 1839. (HOLOTYPE: Hartweg 523; Guatemala; in rupibus Sunilo, BM? *n. v.*; isotypes at GL, F, LE, P, etc!)

*Drymaria chihuahuensis* Briq. in Ann. Cons. & Jard. Bot. Gen. 13: 370. 1911. (HOLOTYPE: Pringle 331; Mexico: Civitas Chihuahua in rupibus umbrosis prope Chihuahua; G, *n. v.*; isotypes at F, GH, MO, NY, P, US, etc!)

Glabrous to densely stipitate-glandular diffuse to subcespitose perennials to as much as 30 cm. high, the internodes mostly longer than the leaf-blades, the taproot to as much as 6 mm. thick. Leaves opposite, the blades glabrous to densely stipitate-glandular, ovate to reniform, 4–12 mm. long, 3–14 mm. broad, trinerved, apically obtuse to acute and mucronulate, marginally entire, basally acute to subcordate, the petioles 1–5 mm. long, the stipules bifid or trifid, rarely entire, the divisions setaceous, 0.5–3.5 mm. long. Inflorescences of lax few-flowered cymes, the peduncles 5–40 mm. long; bracts ovate, strongly 1-ribbed, scariose, apiculate, 1.5–3.0 mm. long, transparent save for the midrib, mostly shorter than the pedicels, the pedicels subglabrous to densely stipitate-glandular, 2–6 mm. long. Sepals 5, 2.5–6.0 mm. long, 1.5–2.2 mm. broad, glabrous to densely stipitate-glandular, lanceolate to narrowly ovate, trinerved, acute, the midrib occasionally excurrent, the laterals often subapically dissipating; petals 5, 2.5–6.0 mm. long, bifid one-half to two-thirds their length, the lobes oblong, apically emarginate, with one dichotomous vein, exappendiculate, continuous with the trunk, the trunk as long as or longer than the claw; stamens 4–5, 2–4 mm. long, the oblong anthers 0.3–0.8 mm. long; ovary at anthesis ellipsoid, exceeded by the anthers, the elongate style trifid one-third to one-half its length, slightly exceeding the anthers. Capsule 3–4-valved, 2–4 mm. long, many-seeded, the seeds 0.5–0.7 mm. broad, evenly tuberculate, the dorsal tubercles conical, the facial tubercles substellate. Fig 10D (Isotype of *D. chihuahuensis*); Fig. 10E (Isotype of *D. laxiflora*).

Texas through continental Mexico to Guatemala, to the south becoming less glandular and tending to have larger floral parts.

Examination of several isotypes of *Hartweg 523* from Guatemala reveals that the plant, although described as glabrous, possesses a few scattered stipitate glands. *Bernoulli & Cario 3255* at Leningrad, collected in Quezaltenango, matches the types of *D. laxiflora* in all respects except that it is more glandular. Toward the northern end of the range, the species has some very glandular representatives whose seeds are nearly black, pleiochromic and very ornately sculptured. In spite of the extreme variation, some of which appears to be along a north-south cline, only one species seems to be involved. *Bourgeau 2946* and *Rose & Hay 5676* from Mt. Orizaba have petals, the lobes of which are so deeply emarginate as to recall the twice dichotomous petals of *D. longepedunculata*, and it is here suggested that the Series LAXIFLORES is genetically closely related to the Series EXCISAE.

#### N. Series VILLOSAE

Leaves opposite, stipulate, mostly long-petiolate, and ovate to orbicular, often villose. Flowers in few-many-flowered cymes, rarely subsolitary in the axils. Sepals acute or obtuse, 1-3-nerved. Petals (occasionally absent) merely bifid, the lobes usually ciliate-auriculate, 1-7-nerved, unguiculate. Stamens 3-5. Seeds cochleate, tuberculate, the tubercles stellate, cylindric or capitate. Four species of continental Mexico, Central and South America, one introduced in Malaysia. Figs. 11 and 12.

- a. Sepals subdeltoid, glabrous, unctuous; petals with 2-4 filiform auricles on either side; leaves narrowly to broadly orbiculate, not basally cordate; stipules entire, lanceolate; Mexico to Costa Rica.....31. *D. MULTIFLORA*
- a. Sepals lanceolate to ovate or oblong to orbicular, glabrous, glandular or villose, occasionally unctuous; petals with 0-6 filiform auricles on either side; leaves ovate to reniform, rarely orbicular, occasionally cordate; stipules entire or lacerate, the divisions filiform to lanceolate.
- b. Sepals and petals 3.5-7.0 mm. long; leaves cordate, 10-30 mm. broad. Mexico.
- c. Stipules longer than the petioles; pedicels glandular-puberulent; midrib of the outer sepals excurrent; petals with 1 ciliate auricle on either side.....32. *D. CONZATTII*
- c. Petioles longer than the stipules; pedicels villose; midrib of the outer sepals subapically dissipated; petals with 3-6 ciliate auricles on either side.....33. *D. MALACHIOIDES*
- b. Sepals 1.6-3.8 mm. long, the petals rarely to 4 mm. long, but then divided nearly to their base; leaves ovate to reniform, occasionally with cordate bases, 5-15 mm. broad. Mexico to South America; Malaysia.
- d. Sepals elliptic, acute (rarely obtuse, but then rather strongly trinerved); petals, when present, divided about half their length, with 1-4 linear auricles on either side; capsule not or but slightly longer than the sepals; plants villose or hirsute. Mexico to Peru; Malaysia.....34a. *D. VILLOSA* ssp. *VILLOSA*
- d. Sepals oblong to orbicular, obtuse; petals, when present, divided halfway or almost completely to their base, the auricles, when present, deltoid to filiform, if filiform the petals divided nearly to the base; capsule often twice as long as the sepals; plants glabrous to villose. Mexico to Peru, lacking in southern Central America:
- e. Sepals glabrous; petals occasionally auriculate, often divided nearly to the base; tubercles of the seeds stellate or capitate, the dorsal tubercles often longer than broad. Mexico to Peru.....34b. *D. VILLOSA* ssp. *PALUSTRIS*
- e. Sepals villose; petals exauriculate, divided about half their length; tubercles of the seeds stellate, the dorsal tubercles rarely longer than broad. Venezuela, Colombia. ....34c. *D. VILLOSA* ssp. *PARAMORUM*

31. *DRYMARIA MULTIFLORA* Brandege, in Zoe 5:232. 1906. (HOLOTYPE: *Purpus* 1653; dry hills, Salto de Agua, Mexico, UC!; isotypes at F, GH, MO, US, etc.)

Erect or ascending perennials to as much as 50 cm. tall, much branched, the internodes mostly longer than the leaves, glabrous to stipitate-glandular, rarely villosulous. Leaves opposite, the blades glabrous, 4–22 mm. long, 4–25 mm. broad, broadly deltoid-ovate, orbicular or reniform, apically rounded to deeply emarginate, marginally entire, basally truncate to acute, not cordate, weakly 3–5-nerved; petioles 2–20 mm. long, the stipules entire, lanceolate, 1.0–2.5 mm. long. Inflorescences of terminal 3–many-flowered cymes, the peduncles to as much as 10 cm. long, often stipitate-glandular; bracts ovate, 2.5–5.0 mm. long, the pedicels mostly 5–22 mm. long, glabrous or stipitate-glandular. Sepals 5, glabrous, unctuous, rarely with sessile glands, lance-deltoid to deltoid-ovate, apically acute, at least by extension of the midrib, 3–6 mm. long, 1.2–2.0 mm. broad, often saccate basally; petals 5, 2.5–7.0 mm. long, usually equaling or exceeding the sepals, bifid about two-thirds their length, the lobes apically rounded, oblong 2–5-nerved, basally provided with ca. 3 ciliate auricles; stamens 3–5, 2.0–3.5 mm. long, the oblong anthers 0.3–0.5 mm. long; ovary at anthesis globose to ovoid, the style 1–2 mm. long, bifid or trifid about half its length. Capsule 2.0–3.5 mm. long, ovoid, 4–26-seeded, the seeds ca. 1 mm. broad, the dorsal tubercles longer than broad, the facial tubercles substellate. Fig. 11A (Isotype).

Sinaloa, Mexico, to Costa Rica.

*Standley* 83478 from Quezaltenango is highly aberrant. Many flowers are apetalous; others have entire liguliform petals; two flowers had twice-dichotomous petals suggestive of *D. longepedunculata*.

32. *DRYMARIA conzattii* J. Duke sp. nov.

Plantae annuae erectae vel diffusae glanduloso-villosae usque ad 45 cm. altae internodiis saepe quam foliis longioribus. Folia opposita glanduloso-villosa reniforma apice vix acuminata basi cordata leviter 5–7 nervata, 5–20 mm. longa, 5–30 mm. lata, petiolis brevibus ad 2.5 mm. longis. Stipulae integrae vel laceratae lobis filiformibus quam petioli longioribus. Inflorescentiae terminales axillaresque in confertas 3–11-floriferas cymas dispositae rhachide glanduloso-villoso bracteis ovatis 3.0–4.5 mm. longis costis excurrentibus quam pedicellis longioribus. Sepala 5 externa minuta glanduloso-puberula angusto-ovata acuta conspicue 3-costata, 5.0–5.6 mm. longa, 1.8–2.0 mm. lata, interna paulo breviora paene glabrescentia; petala 5, 4.0–4.5 mm. longa 3/4-bifida lobis oblongis obtusis gradatim ad angust-oblongum unguem constrictis basi ciliatis; stamina 5, 3.0–3.5 mm. longa antheris oblongis ca. 0.6 mm. longis anthesi subglobosis ca. 0.6 mm. longis; ovarium anthesi subglobosum ca. 1 mm. longum stylo subaequale, stylo vix divisio quam antheris brevior. Capsulae maturae non visae. Fig. 11B (Holotype).

MEXICO: OAXACA: de Almoloya à Sta. Catarina, 1000 m., *C. Conzatti* 1688. HOLOTYPE MO; isotype US.

Known only from the type collection.

33. *DRYMARIA MALACHIODES* Briq. in Ann. Cons. & Jard. Bot. Gen. 13:372. 1911. (HOLOTYPE: *Galeotti 4415*; Mexico: Cordillere d'Ario, 4000'; G!; isotype at P!)

Clambering or ascending herbaceous annuals to as much as 45 cm. high, the internodes longer than the leaves, villose with jointed hairs to as much as 1 mm. long. Leaves opposite, the blades reniform to deltoid-ovate, 1–3 cm. long, 1–3 cm. broad, apically rounded, marginally entire, obtuse to cordate basally, weakly



Fig. 11: A. *D. multiflora* (isotype); petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed,  $15\times$ . B. *D. conzattii* (holotype); portion of plant,  $\frac{1}{2}\times$ ; petal,  $6\times$ ; sepal,  $6\times$ . C. *D. malachioides* (holotype); flower,  $7\frac{1}{2}\times$ ; petal,  $6\times$ ; sepal,  $6\times$ . D. *D. villosa* (holotype of *D. barrancae*); petal,  $10\times$ ; sepal  $10\times$ ; seed,  $20\times$ . E. *D. villosa* (isotype of *D. hirsuta*); portion of plant,  $1\frac{1}{2}\times$ ; petal,  $10\times$ ; sepal,  $10\times$ ; seed,  $20\times$ .

5-nerved, scantily villose; petioles 1–20 mm. long, the stipules entire or bifid, the divisions lanceolate to filiform, 1–2 mm. long. Inflorescences of terminal 3–many-flowered cymes, ultimately lax, the peduncles 1–6 cm. long; bracts 1.5–2.5 mm. long, the villose pedicels to as much as 12 mm. long. Sepals 5, 4.5–5.0 mm. long, 1.5–2.0 mm. broad, elliptic, apically acute, obscurely 3-nerved, with a few sessile glands; petals 5, 5–6 mm. long, bifid about two-thirds their length, the lobes spatulate, apically rounded to apiculate, several-nerved, basally provided with 4–6 ciliate auricles; stamens 5, 2–4 mm. long, the oblong anthers 0.5–0.8 mm. long; ovary at anthesis ovoid, the styles longer than the ovary, trifid about half their length. Capsule ellipsoid, ca. 4 mm. long, several-seeded, the seeds ca. 0.6 mm. broad, cochleate, tuberculate, the dorsal tubercles filiform, the facial substellate. Fig. 11C (Holotype).

Known only from the type collection, probably in Michoacan, and a few other collections near Tancitaro, Michoacan.

Certain characteristics of the plant suggest that it might have been derived from *D. villosa*, perhaps through polyploidy, since most of the plant parts are proportionately larger than their equivalents in *D. villosa*.

#### 34a. *DRYMARIA VILLOSA* subsp. *VILLOSA*

*Drymaria villosa* Cham. & Schlecht. in Linnaea 5:232. 1830. (HOLOTYPE: Schiede & Deppe 505; in aquosis prope Jalapam, B, probably destroyed; isotype at LE!)

*Drymaria hirsuta* Bartl. in Presl, Rel. Haenk. 2:8. 1831. (HOLOTYPE: Haenke s.n. Habitat in Peruviae montanis huanoccensibus, PR!)

*Drymaria cubensis* Regel, in Otto & Dietr. Allg. Garten. 8:298. 1840. (No type indicated; horticultural)

*Drymaria ciliaris* Hort. Berol. ex C. A. Mey. in Ind. Sem. Hort. Petrop. 9:71. 1843. (Hort.; no type indicated)

*Drymaria ciliata* Hort. Berol. ex C. A. Mey. loc. cit. 9:71. 1843. (Hort.; no type indicated)

*Drymaria cordata* var. *pilosa* Schlecht. in Linnaea 26:374. 1853. (no type indicated)

*Drymaria cordata* var. *δ villosa* (Cham. & Schlecht.) Rohrb. in Mart. Fl. Bras. 14<sup>2</sup>:260. 1872.

*Drymaria stylosa* Backer, in Bull. Jard. Bot. Buitenz. 2<sup>12</sup>:15. 1913. (no type indicated)

*Drymaria tepicana* M. E. Jones, in Contr. West. Bot. 15:124. 1929. (HOLOTYPE: M. E. Jones 22847; Tepic, Nayarit, POM, !)

*Drymaria barrancae* M. E. Jones, loc. cit. 18:65. 1931. (HOLOTYPE: M. E. Jones 27051a; La Barranca, Guadalajara, POM!)

Prostrate or ascending annuals to as much as 45 cm. long, the internodes mostly longer than the leaves, villose to hirsute with septate hairs to as much as 2 mm. long. Leaves opposite, the blades scantily to densely villose or hirsute with cinereous or ochraceous hairs, orbicular to reniform, apically rounded to acute and apiculate, basally cordate to truncate, weakly 3–7-veined, 5–15 mm. long, 5–15 mm. broad; petioles 1–10 mm. long, the stipules mostly entire, 0.5–1.5 mm. long, scarcely distinguishable from the indument. Inflorescences of terminal and axillary 5–many-flowered cymes, the ultimate branches often tending to be racemose; peduncles 1–5 cm. long; bracts 0.5–1.5 mm. long, the pedicels 2–20 mm. long, villose. Sepals 5, 2.0–3.6 mm. long, 1–2 mm. broad, narrowly to broadly ovate or elliptic, apically acute to obtuse, villose, occasionally glabrescent, weakly



3-nerved, with translucent borders; petals 5 [absent or drastically reduced in *D. villosa* forma *tepicana* (M. E. Jones) J. Duke com. & stat. nov.], 2.0–3.6 mm. long, bifid for half their length or more, the lobes apically acute to deeply emarginate, 4-nerved, basally provided with caducous filiform auricles, these variable in number and orientation; stamens usually 5, 2.0–3.5 mm. long, the oblong anthers 0.3–0.5 mm. long, the filaments shallowly connate, devoid of staminodia; ovary at anthesis ovoid to globose, the style 1.0–1.5 mm. long, trifid to as much as half its length. Capsules ovoid to ellipsoid, 2.0–3.5 mm. long, equaling or exceeding the sepals, many-seeded (rarely as few as two in *D. barrancae*), the seeds cochleate, 0.5–0.9 mm. broad, tuberculate, the dorsal tubercles cylindric to capitate, the facial tubercles stellate. Fig. 11D (Holotype of *D. barrancae*); Fig. 11E (Isotype of *D. hirsuta*).

Central Mexico through Central America along the western coast of South America to Peru; apparently introduced and rather widespread in the East Indies.

Examination of adequate material from Mexico, type locality of *D. villosa*, from Peru, type locality of *D. hirsuta*, and from Java, type locality of *D. stylosa*, clearly shows that these are conspecific. Indonesian material is marked although inconsistently, by glabrous sepals and hirsute indument, in contrast to Mexican material, which is predominantly villose.

I have seen no specimen representing this species from the West Indies, and believe very strongly that the epithet *cubensis* results from error or misconception. The contention seems to be supported by the following quote (from Ind. Sem. Hort. Petrop. 9:71. 1843): "1093. DRYMARIA CILIATA. Eadem planta, jam diu sub *D. ciliaris* et *D. ciliatae* H. Berol. nomine culta, nunc sub nomine *D. cubensis* H. Berol. in hort. occurit. Num sit *D. cubensis* species a *D. ciliata* distincta? Ignoramus. — Nostra planta *D. villosae* est proxima et vix nisi pilis in caule et foliis rarioribus ad illa differt. M." I have seen numerous horticultural specimens under these names from various European herbaria and they were all referable to *D. villosa*.

36b. DRYMARIA VILLOSA ssp. *palustris* (Cham. & Schlecht.) J. Duke comb. & stat. nov.

*Drymaria palustris* Cham. & Schlecht. in Linnaea 5:232. 1830. (HOLOTYPE: Schiede & Deppe 504; in paludosis prope Jalapam, B, probably destroyed; Lectotype Schiede & Deppe 405, LE!)

*Drymaria pauciflora* Bartl. in Presl, Rel. Haenk. 2:8. 1831. (HOLOTYPE: Haenke s. n.; Habitat in Peruviae montanis huanoccensibus; PR!)

*Drymaria cordata* var. *β palustris* (Cham. & Schlecht.) Rohrb. in Mart. Fl. Bras. 14:260. 1872.

*Drymaria townsendii* Robinson, in Bot. Gaz. 30:58. 1900. (HOLOTYPE: Townsend & Barber 231; on the Sierra Madre 8 km. southeast of Colonia Garcia, Chihuahua, GH!; isotypes at F, MO, US, etc.)

*Drymaria nummularia* Briq. in Ann. Conserv. & Jard. Bot. Gen. 13:371. 1911. (HOLOTYPE: Galeotti 4416; Mexicum: Cordillere d'Ario, 4000', G!; isotype at K.)

*Drymaria subsessilis* M. E. Jones, in Contr. West. Bot. 15:125. 1929. (HOLOTYPE: M. E. Jones 22848; in rivulets at Ixtlan, Nayarit, POM!)

*Drymaria sphagnophila* Baehni & MacBride, in Field Mus. Bot. 13:625. 1937. (HOLOTYPE: MacBride 1542; sunny sphagnum bog, Mito, Huánuco, Peru; F!)

Prostrate annuals or erect perennials (in var. *perennis* J. Duke var. nov.\*) shorter to longer than the leaves, glabrous, glandular, or rarely villose and glabrescent, the prostrate forms often rooting at the nodes, the erect forms tending to become suffrutescent. Leaves opposite, the blades 2–15 mm. long, 2–15 mm. broad, deltoid-ovate to reniform, apically rounded to apiculate, marginally entire, basally obtuse to cordate, glabrous, glandular, or villose and usually glabrescent, weakly 3–7-nerved; petioles 0.5–6.0 mm. long, the stipules entire, (rarely lacerate in var. *perennis*) filiform to lance-deltoid, 0.5–2.0 mm. long. Inflorescences of terminal and axillary 1-many-flowered cymes, the peduncles 0–10 cm. long; bracts ovate, to elliptic, acute to obtuse, 0.5–2.0 mm. long, the pedicels glabrous, rarely glandular or villosulous, 1–15 mm. long. Sepals 5, 1.0–3.0 mm. long, 1–2 mm. broad, glabrous or with sessile glands, oblong to orbicular, apically obtuse and often cucullate, very obscurely trinerved, the midrib subapically dissipating, often distally saccate; petals 5 [absent in subsp. *palustris* forma *townsendii* (Robinson) J. Duke comb. & stat. nov.], 1–4 mm. long, bifid from half to nearly all their length, the lobes oblanceolate to oblong, apically acute to emarginate, 1–2-nerved, the shallowly cleft petals exauriculate or with mere dentations, the deeply cleft petals usually with ciliate, downwardly directed auricles; stamens 2–5, 1.0–2.5 mm. long, the oblong to suborbicular anthers 0.2–0.4 mm. long; ovary at anthesis ovoid to globose, the styles 1.0–1.5 mm. long, bifid or trifid half their length or more, usually at least as long as the ovary. Capsule 2.0–3.5 mm. long, usually exceeding the sepals, occasionally twice as long, 5–24-seeded, the seeds cochleate, 0.6–1.1 mm. broad, densely tuberculate, the dorsal tubercles longer than broad, occasionally capitate, the facial tubercles usually stellate. Fig. 12A (Holotype of *D. villosa* ssp. *palustris* var. *perennis*); Fig. 12B (Isotype of *D. nummularia*); Fig. 12C (Isotype of *D. pauciflora*); Fig. 12D (Holotype of *D. sphagnophila*); Fig. 12E (Holotype of *D. townsendii*); Fig. 12F (Holotype of *D. subsessilis*).

Mexico through Central America at high altitudes down western South America to Peru. Bolivia.

Three rather easily discernible elements may be distinguished in this subspecies. Firstly, there is typical ssp. *palustris*, which (if I am correct in assuming that Schiede & Deppe 405 at Leningrad is the same as Schiede & Deppe 504, the holotype) has large petals cleft nearly to the base and provided with ciliate auricles. This is an annual plant, usually prostrate and often rooting at the nodes. I have seen no specimens from outside Mexico. Among Mexican specimens of this element are M. E. Jones 22848, Bell & Duke 16624, Rose & Hay 4800, H. E. Moore 2801, Hinton et al. 12233, and J. H. Maysilles 7782.

By far the most common element is that prostrate form whose petals are not so deeply cleft and not so ornate, i.e. there are no ciliate auricles. In habit this is similar to the typical form and no other characters are discernably correlated.

\**D. villosa* ssp. *palustris* var. *perennis* J. Duke var. nov. Subspecie typica differt habitu erecto perenne, sepalis quoque angusto-ovatis vel oblongis saepe glandulosis apice lividis cucullatisque, petalis dimidio fissis exauriculatis vel subexauriculatis. HOLOTYPE: Palmer 187; Alvarez, San Luis Potosí, Mexico, MO.

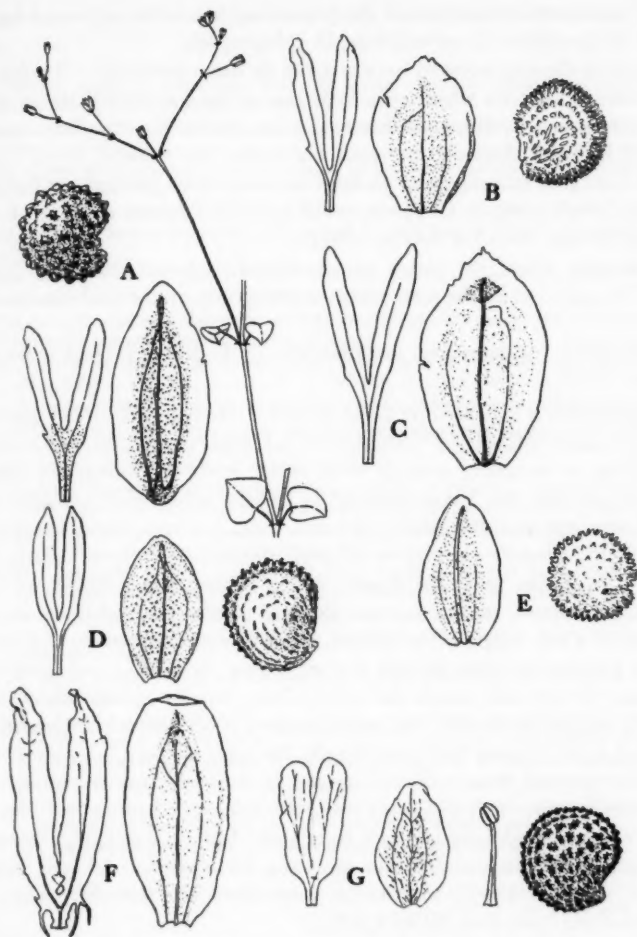


Fig. 12: A. *D. villosa* ssp. *palustris* var. *perennis* (holotype); seed, 20 $\times$ ; petal, 12 $\frac{1}{2}$  $\times$ ; sepal, 12 $\frac{1}{2}$  $\times$ ; portion of plant,  $\frac{1}{4}$  $\times$ . B. *D. villosa* ssp. *palustris* (isotype of *D. nummularia*); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ . C. *D. villosa* ssp. *palustris* (isotype of *D. pauciflora*); petal, 15 $\times$ ; sepal, 15 $\times$ . D. *D. villosa* ssp. *palustris* (holotype of *D. sphagnophila*); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ . E. *D. villosa* ssp. *palustris* forma *townsendii* (holotype); sepal, 10 $\times$ ; seed, 15 $\times$ . F. *D. villosa* ssp. *palustris* (holotype of *D. subsessilis*); petal, 15 $\times$ ; sepal, 15 $\times$ . G. *D. villosa* ssp. *paramorum* (holotype except seed); petal, 5 $\times$ ; sepal, 5 $\times$ ; stamen, 5 $\times$ ; seed, 20 $\times$ .

To this more prevalent portion of the population, the following names have been applied: *D. pauciflora*, *D. nummularia*, *D. sphagnophila*.

The third element seems to have received no name previously. To this belong erect perennial relatives which have little else in the way of differentia, except a more pronounced tendency to have subacute, somewhat cucullate sepals and glandular herbage. Representing specimens of the var. *perennis*, which may have resulted from gene exchange with *D. laxiflora* or one of its relatives, are Palmer 356, and 187, Pringle 3265, I. M. Johnston 8965, M. T. Edwards 804B, H. E. Moore 1669, and Salinas, Rowell & Barkley 16M375.

In Ecuador where the plants are considered medicinal, this, the "Drimaria llamba" is reputed to be the most potently therapeutic of the local species.

34c. *DRYMARIA VILLOSA* subsp. *paramorum* (S. F. Blake) J. Duke comb. & stat. nov.

*Drymaria paramorum* S. F. Blake, in Contr. U. S. Nat. Herb. 20:521. 1924. (HOLOTYPE: A. Jahn 111; Paramo de la Cristalina, Trujillo, Venez.; alt. 2900 m.; US!)

Prostrate or ascending annuals to as much as 20 cm. long, the internodes mostly longer than the leaves, sparsely to densely villose with caducous septate hairs. Leaves opposite, the blades 5–10 mm. long, 4–8 mm. broad, broadly ovate, apically acutish, basally rounded to cordate, trinerved, sparsely to densely villose; petioles 0.5–3.0 mm. long, the stipules entire, scariosae, lance-deltoid, ca. 1 mm. long. Inflorescences of lax 3–many-flowered cymes, the glabrous to villose peduncles to 4 cm. long; bracts scariosae, ovate, acute, mucronulate, 1.0–2.5 mm. long, the glabrous to villose pedicels 2–6 mm. long. Sepals 4–5, subequal, 3.5–4.2 mm. long, 1.2–2.0 mm. broad, the outer villose, broadly oblong, obtuse, weakly trinerved, marginally scariosae, the inner glabrous, almost nerveless, broader; petals 4–5, 3.5–5.0, bifid about half their length, the lobes oblong, 3–7-nerved, obtuse, exauriculate or with minute deltoid auricles at the base, tapered abruptly to the linear claw; stamens 4–5, 2–3 mm. long, the oblong anthers ca. 0.5 mm. long; ovary at anthesis subglobose, the style trifid about half its length, slightly exceeded by the anthers. Capsule equaling or exceeding the sepals, ca. 3.5 mm. long, 15–34-seeded, the seeds 0.8–1.2 mm. broad, tuberculate, the tubercles stellate. Fig. 12G (Holotype; [seed from Pittier 13170]).

Trujillo and Merida, Venezuela; also from the Cordillera Oriental in Colombia.

Certain specimens of *D. ovata* from Ecuador (e.g. Fosberg & Giles 23225 and Rose & Rose 23225) seem to share some of the characteristics of this subspecies.

O. Series GRANDIFLORES

Leaves opposite, ovate to reniform, sessile or petiolate, entire or crenulate, stipulate, the stipules entire or lacerate. Flowers in lax or subcapitate terminal or axillary many-flowered cymes. Sepals acute or obtuse, weakly to strongly 3–7-nerved, the midrib often carinate. Petals bifid (absent in *D. apetala*), unguiculate (subexunguiculate in *D. glaberimma*), exauriculate or with deltoid auricles, the lobes 2–15-nerved. Stamens 5. Seeds cochleate, tuberculate (smooth in forms of *D. ovata*), the tubercles domical or conical, not stellate nor capitate nor cylindric.

8 species from Colombia to Argentina, along western South America. Figs. 13 and 14.

- a. Seeds lustrous, smooth to tuberculate; flowers at anthesis obconical; petals about equaling the sepals, bifid ca. half their length, exauriculate.
  - b. Seeds tuberculate; leaves glabrous and pergameneous, the stipules ca. as long the the petioles; Venezuela.....35. *D. FIRMULA*
  - b. Seeds smooth to corrugated; leaves glabrous to villose, membranaceous to pergameneous, the petioles usually longer than the stipules; Colombia to Argentina.....36. *D. OVATA*
- a. Seeds not lustrous, variously tuberculate; flowers at anthesis usually pyriform; petals minute to twice as long as the sepals, bifid one-half to three-fourths their length, occasionally auriculate.
  - c. Petals vestigial or absent; sepals 6–10 mm. long.....37. *D. APETALA*
  - c. Petals present and obvious; sepals 2.5–8.0 mm. long.
    - d. Sepals acute, glabrous; inflorescences often long-pedunculate in the leaf axils; petals occasionally subxunguiculate, the lobes oblong.
      - e. Tubercles of the seeds secondarily tuberculate; trunk of the petal longer than the claw; Peru.....38. *D. GLABERRIMA*
      - e. Tubercles of the seeds simple; trunk of the petals shorter than the claw; Galapagos Islands.....39. *D. MONTICOLA*
    - d. Sepals acute to obtuse, if acute, carinate or glandular; inflorescences terminal; petals unguiculate, the lobes oblong to narrowly obovate:
      - f. Petals 6–15 mm. long, the lobes oblong, tapered to the claw; leaves elliptic to ovate, glabrous to villose, often strongly crenulate; tubercles of the seeds obtuse;
        - g. Sepals more or less obtuse, shorter than the petals, not carinate, often glandular or villose; leaves not crenulate; alpine Peru.....40. *D. GRANDIFLORA*
        - g. Sepals acute, about as long as the petals, the outer carinate, the carinae often serrulate; leaves often crenulate; lomas of Peru.....41c. *D. PAPOSANA* var. *SERRULATA*
      - f. Petals less than 6 mm. long, if rarely that long, with narrowly ovate lobes, truncate to the claw; leaves ovate, glabrous to glandular, not crenulate; tubercles of the seeds often acute:
        - h. Sepals acute, carinate, 4.0–6.5 mm. long, usually glandular; loma plants of Peru and Chile:
          - i. Petal-lobes narrowly obovate, truncate to the claw, conspicuously exerted; inflorescence capitate; Peru.....41b. *D. PAPOSANA* var. *WEBERBAUERI*
          - i. Petal-lobes oblong, tapered to the claw, slightly if at all exerted; inflorescence capitate to cymose; Chile.....41a. *D. PAPOSANA* var. *PAPOSANA*
        - h. Sepals obtuse to acute, if carinate, then obtuse, 2.5–5.0 mm. long, glabrous or slightly glandular; Peru and the Galapagos Islands, Ecuador and Bolivia:
          - j. Sepals ellipsoid to orbicular, very obtuse, occasionally slightly glandular.....42a. *D. ROTUNDIFOLIA* var. *ROTUNDIFOLIA*
          - j. Sepals narrowly to broadly ovate, acutish, glabrous, often carinate.....42b. *D. ROTUNDIFOLIA* var. *NITIDA*

35. *DRYMARIA FIRMULA* Steyermark, in Field Mus. Bot. 28<sup>1</sup>:227. 1951. (HOLOTYPE: Steyermark 56536; Venezuela; Merida; Páramo de los Colorados, between El Molino & San Isidro Alto, 2745–2955 m. Fl)

Ascending or erect herbs to as much as 25 cm. high, the internodes mostly longer than the leaves, often cyanic. Leaves opposite, the blades glabrous, subpergameneous, 3.0–8.5 mm. long, 2.5–7.0 mm., apically acute, marginally involute, basally cordate, subsessile or on petioles to 1.5 mm. long, the stipules lacerate, the divisions linear, caducous, equaling or exceeding the petioles. Inflorescences of lax terminal 3–7-flowered cymes, the axes glabrous to minutely glandular; bracts ovate, 1-nerved, scariosa, 1.5–2.5 mm. long, mostly equaling or exceeding the subtended pedicels. Sepals 5, subequal, glabrous, 3.8–4.8 mm. long, 1.4–2.0 mm.,

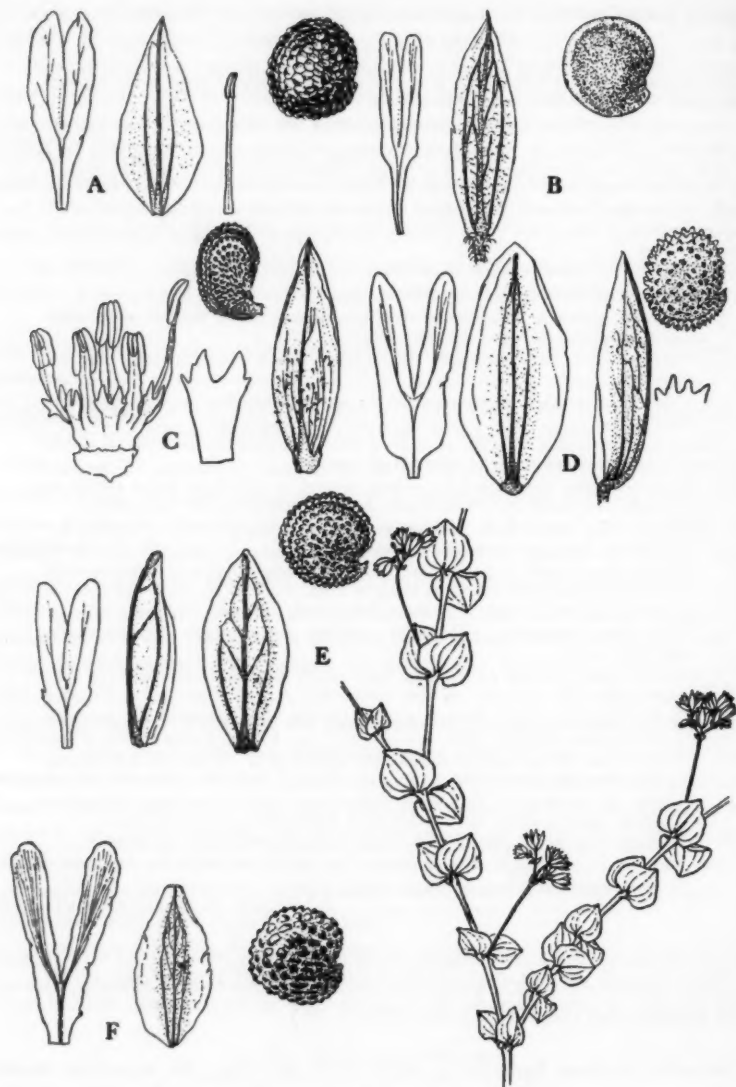


Fig. 13: A. *D. firmula* (holotype); petal, 6 $\times$ ; sepal, 6 $\times$ ; stamen, 6 $\times$ ; seed, 17½ $\times$ . B. *D. ovata*; petal, 6 $\times$ ; sepal, 6 $\times$ ; seed, 15 $\times$ . C. *D. apetala*; androecium, 7½ $\times$ ; "petal", ca. 20 $\times$ ; seed, 15 $\times$ ; sepal, 5 $\times$ . D. *D. glaberrima* (isotype); petal, 7½ $\times$ ; sepals, 7½ $\times$ ; seed, 20 $\times$ ; tubercles of seed, ca. 60 $\times$ . E. *D. monticola* (holotype); petal, 5 $\times$ ; sepals, 5 $\times$ ; seed, 15 $\times$ ; portion of plant, ½ $\times$ . F. *D. grandiflora*; petal, 3 $\times$ ; sepal, 3 $\times$ ; seed, 10 $\times$ .



narrowly ovate to oblong, obtuse, trinerved, the midrib of the outer, somewhat narrower, sepals often excurrent; petals 5, 4.5–5.0 mm. long, bifid slightly more than half their length, the lobes broadly oblong, obtuse, 1–4-nerved, ca. 1 mm. broad, gradually tapered to the claw, exappendiculate or unidentate; stamens 5, 3.0–3.5 mm. long, the oblong anthers ca. 0.6 mm. long; ovary at anthesis ellipsoid, the long style trifid for about one-third its length, about attaining the apex of the sepals. Capsule ovoid, 3-valved, 2 mm. long, 2-seeded, the seed cochleate, 1.2–1.5 mm. broad, dorsally tuberculate, the tubercles low and domical, facially merely reticulate, sublustrous. Fig. 13A (Holotype).

Known only from the type collection.

The lacerate stipules, small domical tubercles on the large seeds and the occasionally 1-nerved petal-lobes suggest a close affinity with *D. cordata*. On the other hand, the size and shape of the petals, coupled with the subsessile, subpergameneous leaves, suggest a closer alliance with *D. ovata*, *D. monticola* and *D. glaberrima*, and these four poorly known species seem to form a closely knit group.

36. *DRYMARIA OVATA* Humb. & Bonpl. ex Roem. & Schultes, Syst. Veg. 5:406. 1819. (HOLOTYPE: *Humb. & Bonpl. s.n.*: crescit prope Quito, alt. 1460 hex. *n.v.*)

Prostrate to rigidly ascending annuals or perennials to as much as 50 cm. high, the internodes mostly longer than the leaves, glabrous, farinose, glandular-puberulent or densely villose. Leaves opposite, the blades glabrous to villose, membranaceous to subpergameneous, deltoid-ovate to reniform, apically acute and apiculate to rounded, basally truncate to subcordate, 5–40 mm. long, 5–30 mm. broad, subsessile or the petioles to as much as 8 mm. long, the stipules mostly lacerate, the divisions filiform to lanceolate. Flowers broadly obconic, 1–many in lax terminal, rarely axillary, cymes, the peduncles to as much as 12 cm. long; bracts lanceolate, 2–5 mm. long, usually shorter than the glabrous to villose pedicels. Sepals 5, glabrous to villose, elliptic to ovate, 4.0–6.5 mm. long, apically acute to obtuse, marginally entire, 3–8-nerved, the inner broader, more obtuse and glabrous; petals 5, 4–7 mm. long, bifid one-half to three-fourths their length, the lobes narrowly oblong, 2–5-nerved, apically obtuse or emarginate, basally truncate or rarely tapered to the narrow claw, usually exappendiculate; stamens 5 (–6), the oblong anthers 0.4–1.0 mm., the filaments 2–5 mm. long; ovary at anthesis ovoid, the style 1–2 mm. long, bifid or trifid about half its length. Capsules 2.0–4.5 mm. long, 2–15-seeded, the seeds tightly circinnate, subdiscoid, 0.9–1.5 mm. broad, smooth or provided with low domical tubercles, often nearly black, lustrous. Fig. 13B (*Lehmann 6112*).

Along the Andes from Venezuela to northern Argentina.

Exhibiting a confusing array of variation, this polymorphic species is difficult of definition, but a rather constant correlation of flower- and petal-shape seems to prevail. The lustre of the seeds, equaled nowhere else in the genus, is usually evident, even in those forms which have tuberculate seeds. The following contrasting characteristics may be found in representative specimens: ovate vs. reni-

form leaves, sessile vs. petiolate leaves, membranaceous vs. subpergameneous leaves, petals tapered vs. truncate to the claw, and smooth vs. tuberculate seeds. With this number of variables, and undoubtedly more exist, many combinations are possible, and I have seen many of them, but am unable to detect any correlations among these characteristics except that, south of Peru, all specimens have had smooth seeds and large leaves. *Weberbauer 6543* from Peru differs in having subpergameneous leaves, 1-2-nerved petal-lobes, and a farinose girdle on the pedicels, characteristics suggesting that it might have resulted from hybridization with *D. cordata*. From Huanuco, *Macbride & Featherstone 1714* has most of the features of *D. cordata* but the seeds are nearly smooth and lustrous, and the veins in the petal-lobes have several branches.

Collections made by Prieto for W. W. Camp in Prov. Cañar and Azuay of Ecuador possessed the colloquial names "Drimaria del cerco" and "Drimaria macho" and the plants are utilized as treatments for liver and kidney ailments.

37. *DRYMARIA APETALA* Bartl. in Presl, Rel. Haenk. 2:7. 1831. (HOLOTYPE: *Haenke s. n.* Habitat in Chile; PR!)

*Stellaria virgata* Seringe, in DC. Prodr. 1:396. 1824. not *D. virgata* Briq., 1911. (HOLOTYPE: patr. ign. "Alsine virgata Deless. herb.": G, n. v.)

*Drymaria macrantha* A. Gray, Bot. U. S. Expl. Exped. 126. 1854. (HOLOTYPE: *Wilkes exped. s. n.*; Obrajillo; US!)

*Drymaria virgata* Briq. in Ann. Cons. & Jard. Bot. 13:370. 1911.

Virgate or sparingly branched suffrutescent perennials (?) to as much as 30 cm. high, the internodes mostly longer than the leaves, locally farinose. Leaves opposite, the blades glabrous to minutely glandular, narrowly to broadly ovate, apically acute, basally cordate and somewhat clasping, 5-15 mm. long, 3-9 mm. broad; stipules mostly entire, deltoid, acuminate, caducous, 0.5-1.5 mm. long. Inflorescences of rather dense few-flowered cymes, the axes often densely glandular; bracts lanceolate, acuminate, strongly 1-ribbed, 2.5-4.0 mm. long; pedicels 2-10 mm. long. Sepals 5, subequal, rather densely glandular, 7.5-9.0 mm. long, narrowly ovate, apically acute with the midrib often excurrent as an apiculum, basally rather strongly trinerved; petals 5, reduced to mere vestiges or completely absent; stamens 5, 5.5-6.5 mm. long, the oblong anthers 1.8-2.0 mm. long; ovary at anthesis narrowly ellipsoid, the trifid style exceeded by the anthers. Capsule included, 5.5-6.5 mm. long, many-seeded, the submature seeds cochleate, rather sharply pointed at the hypocotylar end, dorsally sulcate, weakly tuberculate, the tubercles low and subhemispherical. Fig. 13C.

Although attributed to Mexico, erroneously, and questionably to Chile, I have seen no specimens that were collected outside of Peru. The Pavon specimens from "Mexique" and from Peru, probably are duplicates of one collection.

38. *DRYMARIA GLABERRIMA* Bartl. in Presl, Rel. Haenk. 2:7. 1831. (HOLOTYPE: *Haenke s. n.*; habitat in Peruviae montanis huanoccensibus; PR!; isotype at GOET)

Procumbent or ascending lignescent annuals or perennials to as much as 45 cm. high, the internodes mostly longer than the leaves. Leaves opposite, the blades

glabrous, narrowly to broadly ovate or elliptic, apically acute, marginally entire or undulate, basally obtuse to truncate, 3-5-nerved, subsessile, the stipules filiform, caducous, usually exceeding the petioles. Inflorescences of mostly axillary 3-11 flowered cymes, the peduncles 1-8 cm. long; bracts lanceolate to ovate, 1.5-2.5 mm., all except those of the central flowers equaling or exceeding the glabrous subtended pedicels. Sepals 5, glabrous, narrowly ovate, apically acute to obtuse, weakly 3-5-nerved, 4.0-5.0 mm. long, the inner obtuse, with a broad hyaline margin, ca. 2 mm. broad; petals 5, 3.0-4.5 mm. long, bifid halfway or slightly more, the lobes oblong, obtuse, 3-7-nerved, ca. 0.5 mm. broad, the trunk ca. 1 mm. broad, truncate to a minute claw, or completely exunguiculate; stamens 5, ca. 3 mm. long, the oblong anthers ca. 0.6 mm. long, the filaments basally connate into a very shallow cup; ovary broadly oblongoid, the style ca. 1.5 mm. long, trifid ca. half its length. Capsule oblongoid, 2-10-seeded, the seeds tightly circinnate, tuberculate, the dorsal tubercles longer than broad, often themselves secondarily tuberculate, the facial tubercles low and domical or slightly elongated. Fig. 13D (Isotype).

Known from several stations, all in Peru.

The material that I am citing for this species is heterogeneous indeed and it is possible that more than one taxon is involved. Intensive collecting and field studies will be needed to clarify this whole series, which is still full of problems.

39 DRYMARIA MONTICOLA Howell in Proc. Cal. Acad. 421:329. 1935. (HOLOTYPE: J. T. Howell 9243; Mt. Crocker, Indefatigable Island; CAS!)

Decumbent or ascending perennials, to as much as 40 cm. high, the glabrous internodes exceeding the leaves, the roots to 4 mm. thick. Leaves opposite, the blades glabrous, 3-5-nerved, ovate, acute, marginally undulate, basally truncate to subcordate, subsessile; the stipules mostly bifid, 1-2 mm. long, exceeding the petioles. Flowers in rather dense 5-9-flowered cymes, the peduncles 2-7 mm. long, glabrous, the bracts ovate, 1.0-1.5 mm. long, shorter or slightly longer than the glabrous pedicels. Sepals 4-5, glabrous, narrowly to broadly ovate, weakly 3-ribbed 4.5-6.0 mm. long, 1.5-2.5 mm. broad, apically acute, the midrib subapically dissipating, the lateral ribs weak, with 2 intercalary veins; petals 4-5, 4-5 mm. long, bifid about half their length, the lobes oblong, obtuse, 2-4-nerved, often basally auriculate, tapered to the linear claw; stamens 4-5, 3.5-4.5 mm. long, the oblong anthers 0.7-0.9 mm. long, the filaments basally connate into a cup to as much as 0.7 mm. deep; ovary globose to ovoid, stipitate, the styles 1.5-2.0 mm. long, trifid a little more than half their length. Capsule 2.0-3.5 mm. long, 8-16-seeded, the seeds tightly cochleate, ca. 1 mm. broad, tuberculate, the dorsal tubercles domical, slightly higher than broad, grading into the polygonal facial tubercles. Fig. 13E (Holotype).

Known only from the Galapagos Islands.

This species was likened by its author to *D. apetala* (*D. macrantha*) and in its sessile leaves it does somewhat resemble that species. A closer relative appears to be *D. firmula* from Venezuela which differs somewhat in its strongly three-ribbed sepals and exappendiculate petals. *D. glaberrima* also belongs in this relationship but differs in its tuberculate tubercles and obtuse inner sepals.

40. *DRYMARIA GRANDIFLORA* Bartl. in Presl, Rel. Haenk. 2:7. 1831. (HOLOTYPE: *Haenke s. n.* Habitat in Chile, et in Peruviae montanis huanoccensibus; PR!)

Prostrate or clambering rarely ascending perennials, the internodes mostly longer than the leaves, villose to glabrescent. Leaves opposite, the blades glandular-villosulous, rarely glabrous, narrowly to broadly ovate, weakly to strongly 3-nerved, apically acute, marginally entire, basally rounded to truncate, usually clasping; the main leaves 10–30 mm. long and 5–20 mm. broad, those of the branches much smaller; stipules entire to lacerate 1.0–2.5 mm. long, usually longer than the petioles. Flowers narrowly to broadly campanulate in terminal, lax, few-flowered cymes, the peduncles 1–15 cm. long; bracts 2–5 mm. long, usually much exceeded by the pedicels, the pedicels usually densely glandular-villosulous, 3–25 mm. long. Sepals 5, glandular-puberulent to glabrous, ovate, weakly nerved, 6–8 mm. long, the outer sometimes carinate and acute, the inner flatter and often obtuse; petals 5, 7–12 mm. long, bifid about two-thirds their length, the lobes linear to oblong, apically obtuse, many nerved, to as much as 3 mm. broad, basally gradually merging with the poorly differentiated trunk and claw, exauriculate or rarely unilaterally unidenticulate; stamens 5, the anthers oblong 1.0–1.5 mm. long, the filaments 4–6 mm. long, connate into a cup as much as 1.5 mm. deep; ovary at anthesis ellipsoid, usually longer than the style, the style 2–3 mm. long, trifid about one-third its length. Capsule ellipsoid, 4–5 mm. long, 5–many-seeded, the seeds tightly circinnate 1.2–1.6 mm. broad, coarsely tuberculate, the tubercles dorsally conical, somewhat flattened, grading facially into polygonal tubercles. Fig. 13F.

Peru; departments Huanuco, Cajamarca, and Lima; reported from Chile, but perhaps erroneously.

41a. *DRYMARIA PAPOSANA* var. *PAPOSANA*

*Drymaria paposana* Phil. Fl. Atac. 10. 1860. (HOLOTYPE: *Philippi s. n.*; prope Paposo in valle Tartal alisque locis ejusdem regionis crescit, SGO? *n. v.* photograph of isotype from destroyed Austrian herbarium; MO!)

Upright or ascending annuals to as much as 25 cm. high, the internodes mostly longer than the leaves, glandular-puberulent, the taproot to as much as 2 mm. thick. Leaves opposite, the blades narrowly to broadly ovate, apically acute, basally cuneate to subcordate, glabrous or scantily glandular-puberulent, the upper leaves sessile, 5–20 mm. long, 4–18 mm. broad, the stipules lacerate, the divisions filiform, mostly exceeding the petioles. Inflorescences of terminal subcapitate or monopodial cymes, the peduncles 1–30 mm. long, glandular-puberulent, the bracts ovate, usually longer than the glandular pedicels. Sepals 5, 3.5–5.0 mm. long, ellipsoid, glandular to glabrous, apically obtuse, weakly 3-nerved, the midrib subapically dissipating, the outermost sepals occasionally carinate; petals 5, 3.5–4.5 mm. long, bifid about half their length, the lobes oblong, rarely to 1 mm. broad, apically obtuse or emarginate, 2–3-nerved, tapered gently to the claw, exauriculate; stamens 5, 2.7–3.0 mm. long, the oblong anthers ca. 0.6 mm. long; ovary at anthesis ovoid, the style ca. 1.2 mm. long, trifid about half its length. Capsules 2.6–3.0 mm. long, many-seeded, the seeds cochleate, 0.6–0.8 mm. broad, the tubercles conical, acute. Fig. 14D.



Fig. 14: A. *D. paposana* var. *serrulata*; petal,  $4\frac{1}{2}\times$ ; sepals,  $4\frac{1}{2}\times$ ; seed,  $20\times$ ; portion of plant,  $\frac{1}{2}\times$ . B. *D. paposana* var. *weberbaueri* (holotype of *D. fenziiana*); petal,  $6\times$ ; sepal,  $6\times$ . C. *D. paposana* var. *weberbaueri* (lectotype); petal,  $5\times$ ; sepals,  $5\times$ ; seed,  $20\times$ . D. *D. paposana* var. *paposana*; petal,  $7\frac{1}{2}\times$ ; sepals,  $7\frac{1}{2}\times$ ; seed,  $25\times$ . E. *D. rotundifolia* var. *rotundifolia* (holotype); petal,  $7\frac{1}{2}\times$ ; sepals,  $15\times$ ; seed,  $22\frac{1}{2}\times$ . F. *D. rotundifolia* var. *nitida* (isotype?); petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed,  $15\times$ .

Northern Chile.

Although I. M. Johnston lumped this with *D. cordata*, it is quite distinct from that species in many respects.

41b. *DRYMARIA PAPOSANA* var. *weberbaueri* (Muschl.) J. Duke comb. & stat. nov.

*Drymaria weberbaueri* Muschl. in Engl. Bot. Jahrb. 45:451. July 25, 1911. (HOLOTYPE: Weberbauer 1662; Peru, Barranca prope Lima in formatione "Loma" dicta, 50-200 m. s. m.; B, n. v., probably destroyed; as lectotype may be designated Weberbauer 1657 at Geneva!)

*Drymaria feniziana* Briq. in Ann. Cons. & Jard. Bot. Gen. 13:373. May 10, 1911. (HOLOTYPE: Pavon s. n., "Mexique", G!)

Erect or ascending annuals to as much as 30 cm. tall, the few internodes mostly longer than the leaves, glabrous to glandular-pubescent. Leaves opposite, the blades glabrous to glandular-puberulent, narrowly to broadly ovate, 5-20 mm. long, 4-15 mm. broad, apically acute, basally cuneate to truncate or subcordate, usually sessile, the lacerate stipules mostly longer than the petioles. Inflorescences of terminal, usually subcapitate, 3-many-flowered cymes, the peduncles 1-4 cm. long, the pedicels 0.5-3.0 (-5.0) mm. long, glandular-puberulent, usually exceeded by the ovate, occasionally dentate, bracts. Sepals 5, 3.5-7.0 mm. long, ovate, usually glandular, the outer acute and often carinate, 1-3-nerved, the inner often broader, more obtuse, less glandular; petals 5; 5-7 mm. long, usually exceeding the sepals, bifid little more than half their length, the lobes broadly oblong to spatulate, to 2 mm. broad, 3-many-nerved, apically obtuse or emarginate, basally auriculate, often asymmetrically so, more or less truncate to the linear claw; stamens 5, 3.0-5.0 mm. long, the oblong anthers 0.5-1.0 mm. long, the filaments shallowly connate; ovary at anthesis ovoid to ellipsoid, the style 1.0-2.5 mm. long, trifid for about one-third its length. Capsule ovoid, 3-valved, often stipitate, 2.5-4.0 mm. long, many-seeded, the seeds cochleate, 0.5-1.0 mm. broad, tuberculate, the tubercles mostly domical and obtuse. Fig. 14B (Holotype of *D. feniziana*); Fig. 14C (lectotype of *D. weberbaueri*).

Lomas of Peru from the departments of Lima to Arequipa.

With its rather dense clover-like heads, this is perhaps the most handsome *Drymaria*. A nice photograph may be seen in Goodspeed and Stork (in Univ. Cal. Publ. Bot. 28: pl. 8. 1955). Although Briquet in his description of *D. feniziana* believed it to be a Mexican species, it becomes apparent that the label on the Pavon specimen had suffered the same fate as those on some of his specimens of *D. apetala*, some of which were labeled as being from Mexico and others from Peru, although obviously belonging to the same collection.

Toward the southern end of its range, this variety intergrades with the var. *paposana* and the newly described var. *serrulata*.

41c. *DRYMARIA PAPOSANA* var. *serrulata* J. Duke var. nov.

Plantae perennes erectae vel glabrae sublignosae internodis quam foliis saepe longioribus, radice usque 1 cm. in diametro. Folio opposita laminis glabris anguste vel late ovatis apice acutis saepe mucronatisque basim tuncatis usque cordatis, saepe



marginibus conspicue crenulatis 5-nervatisque subsessilibus, stipulis laceratis quam petiolis longioribus. Flores 3 usque multi cymis terminalibus laxis aut vix confertis pedunculis 1–8 cm. longis, pedicellis minus 1 cm. longis rare divaricatis. Sepala 5, 5–8 mm. longa, 2.5–3.5 mm. lata minute granulosa angusto-ovata vel elliptica, apice acuta (externissimo carinato cum carinis saepe serrulatis); petala 5, 6–8 mm. longa, 2/3-bifida lobis oblongis 4–6-nervatis exauriculatis vel auriculatis parvis vix ungue constricto; stamina 5, 4.5–6.5 mm. longa, antheris oblongis ca. 1.5 mm. longis; ovaria ovoidea vel ellipsoidea, stylo ca. 2 mm. longo, 3/4-trifido. Capsulae inclusae seminibus multis ca. 0.8 mm. latis crasse tuberculatis opacis. Fig. 14A.

PERU: Dept. Arequipa, Prov. Caraveli; Lomas de Atiquipa (Taimara); falda arcillosa-pedregosa, 500–550 m.; *Ramon Ferreyra 13490*. (HOLOTYPE MO).

Not uncommon in the lomas from the departments of Arequipa and Moquegua, this unusual variety seems largely to replace var. *weberbaueri*, and although it resembles that variety in habit, the differences in their flowers are quite striking. Although the epithet applies to the carina of the outer sepals, the leaves themselves are often distinctively crenulate, so much so as to appear serrulate. See Fig. 14A.

#### 42a. DRYMARIA ROTUNDIFOLIA var. ROTUNDIFOLIA

*Drymaria rotundifolia* A. Gray, Bot. U. S. Expl. Exped. 123. 1854. (HOLOTYPE: *Wilkes Expedition s. n.* Obrajillo, Peru US!)

Upright annuals to as much as 20 cm. high, the internodes mostly longer than the leaves, glabrous to glandular-puberulent. Leaves opposite, the blades glabrous to minutely glandular, reniform, apically rounded or apiculate, basally clasping, 4–10 mm. long, 5–15 mm. broad; the stipules lacerate, caducous. Inflorescence of rather congested 3–11-flowered cymes, the peduncles glandular, 1–45 mm. long; bracts scarious, ovate, acute, 0.5–2.0 mm. long; pedicels mostly 1.5–3.0 mm. long, those of the central flowers to 8 mm. long; glandular. Sepals 5, glabrous or sessile-glandular, broadly ellipsoid, obtuse or rounded, subcucullate, weakly 3-nerved, the midvein subapically dissipating, often carinate, marginally scarious and transparent, 2.5–3.5 mm. long, 1.2–2.8 mm. broad; petals 5, 3.2–4.5 mm. long, bifid about half their length, the lobes oblong, ca. 0.5 mm. broad, exappendiculate but somewhat flared before narrowing into the linear claw; stamens 5, about 3 mm. long, the oblong anthers about 0.6 mm. long; ovary at anthesis turbinate to ellipsoid, the style trifid about half its length, ca. 1.5 mm. long, exceeded by the anthers. Mature capsule ellipsoid, 2.5–3.5 mm. long, several-seeded, the seeds cochleate, often dorsally sulcate, 0.6–0.8 mm. broad, tuberculate, the tubercles conical, obtuse or rarely acute. Fig. 14E (Holotype).

Peru.

*Stewart 1512* from the Galapagos Islands might just as well be included here as in var. *nitida*. The specimen has some of the characters of both varieties, and perhaps represents a new entity.

#### 42b. DRYMARIA ROTUNDIFOLIA var. *nitida* (J. Ball) J. Duke comb. & stat. nov.

*Drymaria nitida* J. Ball, in Jour. Linn. Soc. 22:31. 1887. (HOLOTYPE: Peru: Ex saxosis Andium Peruviae juxta pagum Chicla, 12–13000' s. m. *J. Ball s. n. K, n. v.*, isotype at GH!)

Minute to rather large ascending annuals to as much as 15 cm. high, the internodes glabrous, mostly longer than the leaves. Leaves opposite, the blades glabrous, often somewhat fleshy, narrowly ovate to elliptic, 3–10 mm. long, 2–8 mm. broad, glabrous, apically acute to cuspidate, marginally hyaline, basally attenuate and clasping, the venation obscure; stipules entire, very fugaceous, acicular, less than 1 mm. long. Flowers campanulate, in rather dense few-flowered terminal cymes, the lowermost bracts merging with the leaves, often stipulate, ovate, ca. 1.5 mm. long; peduncles 4–7 mm. long, the pedicels glabrous, exceeded by or slightly exceeding the bracts. Sepals 5, glabrous, 2.5–3.0 mm. long, the outer broadly oblong and weakly carinate, the inner suborbicular, obtuse, to 2 mm. broad, obscurely nerved, the midnerve often subapically dissipating; petals 5, 3.2–4.0 mm. long, bifid about two-thirds their length, the lobes narrowly spatulate, apically obtuse, 2–3-nerved, exauriculate, acutely tapered to the claw; stamens 3–5, 2.5–3.5 mm. long, the anthers oblong; ovary at anthesis cordate, ca. 8-ovulate, the style deeply trifid. Capsules subglobose, 3–8-seeded, ca. 2 mm. long, the seeds ca. 1 mm. broad, tuberculate, the tubercles subdendritic. Fig. 14F (Isotype).

Peru, Ecuador and the Galapagos Islands.

Although the type is a diminutive plant, other specimens that I refer to this variety attain a good size and in some respects approach *D. glaberrima*: e.g. *Mandon 948* from Bolivia. Characters in the flowers however suggest that it is closer allied to *D. rotundifolia* and *D. paposana*, especially its var. *weberbaueri*.

#### P. Series DIVARICATAE

Leaves opposite, petiolate, elliptic to reniform, stipulate. Flowers in cymes, the pedicels usually long and divaricate, exceeding the bracts. Sepals trinerved, acute, occasionally saccate basally. Petals bifid about half their length, with mamilliform auricles (except *D. divaricata* forms), the lobes (1–) 2–5-nerved. Stamens 4–5. Seeds cochleate, tuberculate, the tubercles domical conical, occasionally subdendritic or mamilliform. Five poorly defined varieties in Peru and Bolivia. Fig. 15.

- a. Leaves broadly ovate to reniform, short- to long-petiolate, glabrous to villosulous; pedicels erect to strongly divaricate, mostly longer than the flowers, if shorter, viscid; sepals usually glandular or villosulous; loma or alpine plants:
  - b. Sepals weakly nerved, basally saccate; petals weakly auricled, the auricles deltoid when present; tubercles of seeds mamilliform or secondarily tuberculate:
    - c. Leaves long-petiolate; petals as long to twice as long as the sepals; seeds with mamilliform or coarsely domical tubercles.....43a. *D. DIVARICATA* var. *DIVARICATA*
    - c. Leaves short-petiolate; petals about as long as the sepals; seeds with the tubercles secondarily tuberculate.....43b. *D. DIVARICATA* var. *STRICTA*
  - b. Sepals strongly nerved, rather evenly keeled, not basally saccate; petals strongly auriculate, the auricles oblong; tubercles of the seeds domical or conical:
    - d. Sepals and herbage densely viscid-glandular; pedicels not divaricate; alpine plants.....43c. *D. DIVARICATA* var. *VISCIDULA*
    - d. Sepals and herbage subglabrous to villosulous; pedicels divaricate; loma plants.....43d. *D. DIVARICATA* var. *DIVERGENS*
- a. Leaves elliptic to broadly ovate, short-petiolate, glabrous; pedicels strongly divaricating, little if any longer than the flowers, glabrous; sepals glabrous; loma plants.....43e. *D. DIVARICATA* var. *REFLEXIFLORA*



Fig. 15: A. *D. divaricata* var. *reflexiflora* (holotype); habit,  $\frac{1}{2}\times$ ; petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed,  $20\times$ . B. *D. divaricata* var. *divaricata*; petal,  $4\times$ ; sepals,  $4\times$ . C. *D. divaricata* var. *stricta* (isotype of *D. agapafensis*); petal,  $6\times$ ; sepal,  $6\times$ ; seed,  $15\times$ . D. *D. divaricata* var. *viscidula* (holotype); petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed,  $15\times$ . E. *D. divaricata* var. *divergens* (holotype); petal,  $7\frac{1}{2}\times$ ; sepal,  $7\frac{1}{2}\times$ ; seed,  $20\times$ ; habit,  $\frac{1}{2}\times$ .

43a. *DRYMARIA DIVARICATA* var. *DIVARICATA* ?

*Drymaria divaricata* HBK. Nov. Gen. & Sp. 6:24. 1832. (HOLOTYPE: Humb. & Bonpl. s. n. Crescit ad litora Oceani Pacifici, prope Lima Peruvianorum, P n. v.)

Laxly spreading annuals, the internodes much longer than the leaves, to as much as 10 cm. long, minutely glandular-puberulent. Leaves opposite, the blades glabrous or minutely puberulent or villosulous, narrowly to broadly deltoid-ovate, 6–12 mm. long, 6–15 mm. broad, apically acute, marginally entire, basally truncate; the distally alate petioles 2–5 mm. long, the stipules filiform, caducous, mostly entire, 1.0–1.5 mm. long. Inflorescence of very lax terminal cymes, the flowers many, squarely campanulate; the glandular-puberulent peduncles to 10 cm. long; bracts oblong to lance-linear, ca. 1 mm. long; the pedicels glandular-puberulent, to as much as 35 mm. long. Sepals 5, glandular-puberulent to glabrous, unctuous, triangular-ovate, apically obtuse to acutish, and often cucullate, basally saccate, 3.0–4.5 mm. long; petals 5, 5–9 mm. long, bifid about two-thirds their length, the lobes narrowly spatulate, weakly 2–5-veined, apically obtuse, basally merging gradually with the linear claw, exauriculate to minutely denticulate; stamens 5, 3.5–5.0 mm. long, the anthers oblong 0.3–0.6 mm. long. Ovary at anthesis ovoid, the style trifid one-fourth to one-half its length 1.5–2.5 mm. long. Capsule ovoid, 2.5–3.5 mm. long, ca. 8-seeded, the seeds tightly circinnate, 0.8–1.5 mm. broad, coarsely tuberculate, the dorsal tubercles longer than broad, sub-dendritic. Fig. 15B (Pennell 14560).

Province of Lima, Peru.

Since I have not seen the type of *D. divaricata*, I sent specimens of all the varieties herein recognized to Dra. Lourteig for comparison with the Humboldt and Bonpland specimen in the Historical Herbarium at Paris. After comparison with the various specimens sent, she selected *Ferreya* 3460 as the best match for *D. divaricata* HBK. Also representing the typical variety is *Pennell* 14560 which is illustrated in Fig. 15B. This has quite long petals proportionately much longer than those of *Ferreya* 3460. Both specimens have peculiar dwarf flowers in the axils of some of the unusually small bracts. Both were collected at altitudes higher than 2700 meters, which might seem incompatible with the type locality, the description of which would at least suggest that *D. divaricata* might be a loma plant.

43b. *DRYMARIA DIVARICATA* var. *stricta* (Rusby) J. Duke comb. & stat. nov.

*Drymaria stricta* Rusby in Phytologia 1:55. 1934. (HOLOTYPE: G. H. H. Tate 160. Pongo de Quime Bolivia, alt. 12,000 ft. NY!)

*Drymaria agapatensis* Baehni & Macbride, in Field Mus. Bot. 13:619. 1937. (HOLOTYPE: Lechler 1947; Puno, Agapata, G!; isotype at UPS, F, MO, P, etc.)

Upright or ascending lignescent annuals or perennials to as much as 30 cm. high, the internodes mostly longer than the leaves, minutely but obviously glandular-puberulent. Leaves opposite, glandular-puberulent, the blades ovate to reniform, apically acute, marginally entire or undulate, basally truncate to cordate, 5–14 mm. long, 5–20 mm. broad, the petioles often alate, 2–6 mm. long, stipules lacerate, the laciniae filiform to acicular, 1.5–2.0 mm. long. Inflorescence of

mostly terminal lax, several-flowered cymes, the peduncles 1–6 cm. long, glandular-puberulent, bracts oblong to lance-deltoid, 1–2 mm. long, mostly exceeded by the pedicels, these 1–10 mm. long, sepals 5, glandular-puberulent, ovate, basally saccate but not carinate, apically acute to shortly acuminate, subcucullate, 4.5–5.5 mm. long, weakly 3–4-nerved; petals 5, 4.5–5.5 mm. long, bifid for 2–3 mm., the lobes linear, obtuse to emarginate, narrowed to the linear claw, 1-nerved, usually auriculate; stamens 5, the anthers often aberrant, oblong to orbicular, ca. 0.3 mm. long; ovary at anthesis ovoid, the style about as long, 1.5–2.5 mm. long, trifid about half its length. Capsule 2.5–3.5 mm. long 2–8-seeded, the seeds tightly circinnate, 0.8–1.0 mm. broad, densely tuberculate, the dorsal tubercles secondarily tuberculate, the facial irregularly polygonal. Fig. 15C (Isotype of *D. agapatensis*).

Peru and Bolivia.

The seeds of this variety are among the most bizarre in *Drymaria*. Some specimens are referred here only reluctantly as they approach *D. glaberrima*, a species which shares the unusual tuberculation of the seeds.

43c. *DRYMARIA DIVARICATA* var. *viscidula* (A. Gray) J. Duke comb. & stat. nov.

*Drymaria viscidula* A. Gray, Bot. U. S. Expl. Exped. 1:124. 1854. (HOLOTYPE: Wilkes exped. s. n.; Obrajillo, Peru US!)

Upright annuals to as much as 35 cm., the internodes mostly longer than the leaves. Leaves opposite, the blades glabrescent, broadly ovate, apically acute and mucronulate, basally subcordate, 5–8 mm. long, 6–10 mm. broad, the veins very obscure; petioles 1–2 mm. long, glabrescent; stipules entire or bifid, the divisions linear, deciduous, 1.0–1.5 mm. long. Inflorescences of 3–9-flowered cymes, the peduncles rather densely glandular-pubescent; bracts linear, 1.0–2.5 mm. long, gradually reduced; pedicels 1.0–2.5 mm. long. Sepals 5, subequal, the outer glandular, broadly lanceolate, acute, strongly 3-nerved, 3–4 mm. long, ca. 1 mm. broad, the inner flatter, obtuse, 1.0–1.5 mm. broad, with scarios margins outside the 3 ribs; petals 5, 3.5–4.0 mm. long, bifid about half their length, the lobes oblong, ca. 0.5 mm. broad, basally auriculate, the auricles obtusely deltoid, the claw gradually tapering to the auricle; stamens 5, ca. 3.2 mm. long, the anthers oblong, ca. 0.5 mm. long; ovary at anthesis subglobose, exceeded by the anthers, the style trifid more than half its length, slightly exceeding the anthers. Capsule ovoid, 2.8–3.5 mm. long, maturing ca. 6 seeds, the seeds cochleate, ca. 0.7 mm. broad, dorsally tuberculate with low rounded tubercles broader than long, facially flattened or sulcate, merely lineolate. Fig. 15D (Holotype).

Peru, at rather high elevations.

Although in some respects (especially the seeds) suggestive of *D. glandulosa*, I think a perusal of the plate depicting the Series *DIVARICATAE* will convince one that the var. *viscidula* is more properly aligned here.

43d. *DRYMARIA DIVARICATA* var. *divergens* J. Duke var. nov.

Herbae annuae graciles diffusae glanduloso-pilosulosa internodiis saepe quam foliis longioribus. Folia opposita laminis reniformibus apice rotundatis vel obtusis

mucronatisque basi truncatis aut rotundatis, 5–12 mm. longis, ea in ramis lateralibus saepe reducta petioli saepe in longitudine laminae foliorum aequales stipulis lanceolatis frequenter quam petiolis brevioribus. Flores in cymas terminales pleures dispositi pedicellis saepe divergentibus frequenter  $2-4 \times$  in longitudine pluribus quam floribus bracteis lanceolato-linearibus usque ad 3 mm. longis. Sepala 5, 3.5–4.5 mm. longa ovata acuta 3-nervata vix stipitato-glandulosa; petala 5, sepalis aequalia ut vix plus, bifida lobis angusto-spatulatis obtusis vel truncatis 3–5-nervatis basi auriculatis ungue lineari; stamina 5 quam petala breviora, antheris oblongis ca. 0.6 mm. latis. Capsulae inclusae seminis cochleatis. Ca. 0.8 mm. latis tuberculatis tuberculis dorsalibus latis quam longioribus. Fig. 15E (Holotype).

PERU: Dept. Lima, prov. Pativilca; Lomas de Pacar, alt. 150–700 m. O. V. Nuñez 2320 (HOLOTYPE, US).

If I have erred in my interpretation of the typification of *D. divaricata* HBK., this variety of the Peruvian lomas would be my second choice, and indeed were it not for the kind assistance of Dra. Lourteig, I believe this new variety would be masquerading under the name *D. divaricata* HBK. The similarities of the two concepts are strong, but the slight morphological differences plus the ecologic separation seem to warrant varietal segregation.

43e. *DRYMARIA DIVARICATA* var. *reflexiflora* J. Duke var. nov.

*Drymaria divaricata* Auct. Am. non HBK.

Plantae parvae ascendentes ad 25 cm. altae internodis quam foliis saepe longioribus glabris. Folia opposita glabris, eis in rostellam aggregatis spatulatis longe petiolatisque gradatim foliis caulibus anguste ad late ovatis vel elliptico-ovatis acutis basi truncatis saepe undulatis (in marginibus) mixtis, eisdem etiam secundum breves alatos petiolos attenuatis, petiolis saepe quam stipulis brevioribus stipulis saepe trifidis lobis filiformibus, 1.0–2.5 mm. longis. Flores campanulata in laxas evidenter trichotomas cymas foliis veris ovatis bracteis connixtis; bractea 2–4 mm. longae, acutae vel acuminatae, prope aequales vel praestantes divaricatis glabris pedicellis. Sepala 5, glabra ovata vel elliptica, 3.0–4.5 (–5) mm. longa evidenter 3-costata basim umbonata vix saccata exteriora acuta, interiora obtusa vel acuta; petala 5, vix exserta 3.0–4.5 mm. longa, 2/3-bifida lobis angusto-spatulata apice obtusa 3–7-nervata, basi auriculata vel biauriculata tum in unguem linearem constricta; stamina 5 antheris fertilibus saepe reductione 3 oblongis filamentis 3.0–3.5 mm. longis; ovarium ovoideum, 2.5–3.5 mm. longum, stylo 1.0–1.8 mm. longo, 1/2-fido trilobato. Capsulae ovoideae, 15–25-seminiferae seminibus constrictis circinatis ca. 0.6 mm. latis tuberculis dorsalibus latis quam longioribus scabris superficie tuberculis conicis vel ellipsoideis munitis. Fig. 15A (Holotype).

PERU: Dept. Lima, Prov. Chancay; Lomas de Chancay, 500–600 m.; Ferreyra 11522. (HOLOTYPE, MO).

Although long confused with typical *D. divaricata* HBK., also reputed to be a loma plant, there is little doubt that this variety is distinct, morphologically and possibly ecologically. Plants representing this new variety bear little resemblance to var. *divaricata*, as depicted in a photograph of the type.



## Q. Series CORDATAE

Leaves opposite, ovate to reniform, sessile to petiolate, entire, stipulate, the stipules entire or lacerate. Flowers in terminal cymes, rarely solitary in the axils. Sepals mostly acute, 1-3-nerved. Petals bifid (occasionally ligular in *D. xerophylla*), unguiculate, exauriculate (poorly defined auricles occasionally present in *D. gracilis*), the lobes 1-nerved (except *D. galeottiana*). Stamens 2-5, the anthers orbicular to oblong. Styles 2-3, free or basally united. Seeds 1-many, cochleate, tuberculate, the tubercles domical or rectanguloid, contiguous to remote. Five species, 1 more or less pantropical, 1 ranging from western U. S. A. to Argentina, the others confined to Mexico and vicinity. Figs. 16, 17, 18.

- a. Petals about equaling the sepals, the lobes 1-4-nerved; sepals 1-nerved and carinate or 3-nerved and subcarinate; seeds numerous, less than 1 mm. broad:
  - b. Leaves deltoid, long-petiolate, the stipules lacerate or entire, shorter than the petioles; petals divided more than half their length, the lobes 1-nerved:
    - c. Stipules lacerate; seeds coarsely tuberculate, the tubercles approximate; continental Mexico and northern Central America.....44a. *D. GRACILIS* ssp. *GRACILIS*
    - c. Stipules entire; seeds merely verruculose with remote protuberances. Baja California.....44b. *D. GRACILIS* ssp. *CARINATA*
  - b. Leaves ovate to reniform, subsessile, the stipules lacerate, longer than the petioles; petals divided about half their length, the lobes 2-4-nerved.....45b. *D. GLANDULOSA* var. *GALEOTTIANA*
- a. Petals shorter than the sepals, the lobes 1-nerved; sepals trinerved; ecarinate (except *D. cordata* ssp. *diandra*); seeds 1-many, 0.5-2.0 mm. broad.
  - d. Petals much shorter than the sepals, bilobed or ligular; seeds 0.5-0.8 mm. broad, the facial tubercles rectanguloid or lineolate, remote; stipules lacerate:
    - e. Flowers in terminal cymes; leaves obviously petiolate; petals bifid; stamens 3-5; seeds 5-many; plants usually densely glandular.....45a. *D. GLANDULOSA* var. *GLANDULOSA*
    - e. Flowers clustered in the axils of subsessile leaves; petals bifid or ligular; stamens 3, seeds 1-3; plants usually glabrous.....46. *D. XEROPHYLLA*
  - d. Petals little to much shorter than the sepals, bilobed; seeds 0.7-2.0 mm. broad, the tubercles more or less domical and subcontiguous; stipules entire or lacerate:
    - f. Leaves deltoid-ovate, the stipules entire; secondary veins forming a crinkled interrupted reticulum; stamens 4-5, seeds 3-5; styles united for half their length or more; southern Mexico, Guatemala and Bolivia.....47. *D. LADEWII*
    - f. Leaves deltoid-ovate to reniform, the stipules lacerate; secondary veins obscure; stamens 2-5; seeds 1-12; styles completely free or united to half their length; pantropical complex:
      - g. Flowers campanulate, the pedicels usually with a conspicuous glandular girdle; sepals ecarinate or subecarinate, glabrous to densely glandular, not apically incurved; stamens 2-5; seeds 1-12, 0.8-1.5 mm. broad; pantropical.....48a. *D. CORDATA* ssp. *CORDATA*
      - g. Flowers pyriform, the pedicels without a clearly delineated girdle; sepals carinate, densely glandular, apically incurved; stamens 2 (-4); seeds 1-2 (-4), 1.5-2.0 mm. broad; Old World Tropics.....48b. *D. CORDATA* ssp. *DIANDRA*

44a. *DRYMARIA GRACILIS* ssp. *GRACILIS*

*Drymaria gracilis* Cham. & Schlecht. in Linnaea 5:232. 1830. (HOLOTYPE: Schiede & Deppe 503; prope Jalapa. B, n. v. isotype at GOET!)

*Drymaria cordata* var.  $\gamma$  *gracilis* (Cham. & Schlecht.) Rohrb. in Mart. Fl. Bras. 14<sup>2</sup>:260. 1872.

Erect or ascending perennials to as much as 45 cm. tall; the internodes mostly longer than the leaves, glabrous or minutely stipitate-glandular; leaves opposite, the blades glabrous, rarely villosulous or punctate, deltoid-ovate (narrower upwards), 5-15 mm. long, 3-15 mm. broad, apically acute to rounded and apiculate, marginally entire, basally truncate 3-5-nerved, the petioles 1-8 mm. long; the stipules

bifid or trifid, 1.0–2.5 mm. long, the divisions filiform. Inflorescences of lax terminal, many-flowered cymes, the peduncles 2–6 cm. long; bracts ovate, carinate, 0.5–1.5 mm. long; pedicels 3–6 mm. long, glabrous, divaricate. Sepals 5, ovate, glabrous, 2.0–2.7 mm. long, apically acute, 1-nerved, carinate; petals 5, 2.0–2.7 mm. long, bifid at least two-thirds their length, the lobes obtuse to emarginate, basally entire to auriculate, divaricate, tapered or truncate to the minute claw; stamens 5, rarely fewer, 1.8–2.2 mm. long, the anthers oblong, 0.4–0.5 mm. long, briefly connate into a shallow cup; ovary at anthesis globose, the styles elongate, bifid or trifid less than half their length, exceeding the ovary; capsule globose, equaling or exceeding the sepals, 1.8–2.5 mm. long, many-seeded, the seeds cochleate, 0.5–0.6 mm. broad, coarsely tuberculate, the dorsal tubercles domical, the facial tubercles polygonal, approximate. Fig. 16B.

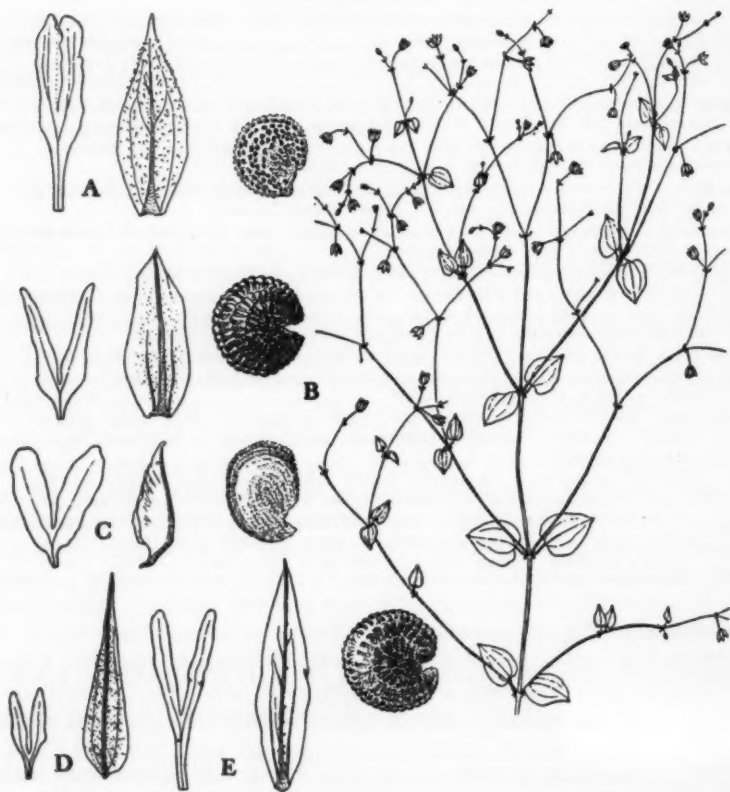


Fig. 16: A. *D. glandulosa* var. *galeottiana* (holotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 22½ $\times$ . B. *D. gracilis* ssp. *gracilis*; petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ ; habit, ½ $\times$ . C. *D. gracilis* ssp. *carinata* (isotype); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 20 $\times$ . D. *D. glandulosa* (holotype of *D. leptoclados*); petal, 10 $\times$ ; sepal, 10 $\times$ . E. *D. glandulosa* (holotype of *D. fendleri*); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 25 $\times$ .

Hidalgo to Vera Cruz, Mexico.

Specimens in the Lund Herbarium, and the herbaria at Leningrad and the Field Museum, although labeled as grown from seeds of *D. divaricata*, are clearly referable to *D. gracilis*. Somewhere a mixup in labels must have occurred. For that reason, I sent a specimen of this species to Dra. Lourteig for comparison with the type of *D. divaricata*. As mentioned in the discussion of *D. divaricata* previously, she cited the Peruvian *Ferreya* 3460, very different from the Mexican *D. gracilis*, as comparable to *D. divaricata* HBK.

44b. *DRYMARIA GRACILIS* ssp. *carinata* (Brandege) J. Duke comb. & stat. nov.

*Drymaria carinata* Brandege, in Zoe 2:70. 1891. (HOLOTYPE: Brandege 34; Sierra de la Laguna, Baja Calif. UC!)

*Drymaria carinata* var. *perennis* Wiggins, in Proc. Cal. Acad. Sci. 4<sup>25</sup>:197. 1944. (HOLOTYPE: Gentry 4415; La Laguna, Sierra Laguna UC!)

Prostrate to ascending annuals or perennials to as much as 40 cm. high, the internodes mostly longer than the leaves, glabrous. Leaves opposite, the blades glabrous, narrowly to broadly deltoid-ovate, 5–20 mm. long, 2–15 mm. broad, apically rounded to acute, marginally entire, basally truncate, 3-nerved, petioles 1–10 mm. long, the stipules entire, 1–2 mm. long, filiform. Inflorescences of terminal lax 3–many-flowered cymes, the peduncles 2–6 cm. long; bracts ovate, carinate, 1.0–1.5 mm. long, the pedicels 2–12 mm. long, glabrous. Sepals 5, ovate, glabrous, 1.5–2.5 mm. long, apically acute to acuminate, 1-nerved and carinate; petals 5, 1.5–3.0 mm. long, bifid at least two-thirds their length, the lobes apically obtuse to emarginate, 1-nerved, divaricate, basally auriculate to entire, abruptly truncate or tapered to the claw; stamens 3–5, 1.5–2.0 mm. long, anthers oblong 0.3–0.4 mm. long, shallowly connate into a cup; ovary at anthesis globose, the style trifid one-half to five-sixths its length. Capsule globose, 1.5–2.0 mm. long, many-seeded, the seeds cochleate, 0.4–0.6 mm. long, minutely and remotely tuberculate. Fig. 16C (Isotype).

Baja California, Mexico.

This subspecies shares with the typical subspecies the tendency toward perennality. Probably separated for some time, yet obviously closely related, these subspecies exhibit an interesting disjunction.

45a. *DRYMARIA GLANDULOSA* var. *GLANDULOSA*

*Drymaria glandulosa* Presl, Rel. Haenk. 2:9. 1831. (HOLOTYPE: *Haenke s. n.*; habitat in Mexico, Pr!)

*Drymaria ramosissima* Schlecht. in Linnaea 12:206. 1838. (HOLOTYPE: *Hegewisch s. n.*, prope urbem Mexico, GOET (?) *n. v.*)

*Drymaria leptoclados* Hemsl. Diag. Pl. Nov. 2. 1878. (HOLOTYPE: *Bernoulli 240*, Guatemala; Camino del Sapote; K!; isotype at NY)

*Drymaria fendleri* S. Wats. in Proc. Am. Acad. 17:328. 1882. (HOLOTYPE: *Fendler 60*, New Mexico, GH!)

*Drymaria leptoclados* var. *peruviana* J. Ball, in Journ. Proc. Linn. Soc. 22:32. 1885. (HOLOTYPE: *J. Ball s. n.*; Chicla, Peru, K?; isotype (?) at GH!)

*Drymaria blasiana* M. E. Jones, Contr. West. Bot. 15:125. 1929. (HOLOTYPE: *M. E. Jones 22845*; in open places, San Blas, Sinaloa; POM!)

*Drymaria fendleri* var. *perennis* M. E. Jones, Extr. Contr. West. Bot. 18:65. 1933. (HOLOTYPE: *M. E. Jones 27050*, Laguna Mtns., Baja Cal. POM!; isotypes at UC, etc.)

*Drymaria glandulosa* var. *fendleri* (S. Wats.) Fosberg, in Morton, in Contr. U. S. Nat. Herb. 29:96. 1945.

*Drymaria glandulosa* var. *perennis* (M. E. Jones) Fosberg, loc. cit. 29:96. 1945.

Sparingly to densely stipitate glandular upright or ascending annuals or perennials, the internodes mostly longer than the leaves, the taproot to 1 cm. thick. Leaves opposite, the blades sparingly to densely glandular-puberulent, ovate to reniform, 5–12 mm. long, 5–20 mm. broad, apically rounded and apiculate, basally cordate, marginally entire, the petioles 1–8 mm. long; stipules lacerate, the divisions lance-linear to filiform. Inflorescences of terminal and rarely axillary lax to dense 5-many-flowered cymes, the peduncles (0–) 2–8 cm. long (the peduncles often axillary and abbreviated in var. *fendleri*); bracts lanceolate-aristate 2.5–5.0 mm. long, often exceeding the pedicels (especially in var. *fendleri*), lanceolate, weakly to strongly 3-ribbed, the ribs subapically confluent, the mid-rib often excurrent, the outer sepals frequently conspicuously shorter than the inner and more attenuate at the apex, 3.0–4.6 mm. long; petals 3–5, 1.2–3.0 mm. long, bifid about half their length, the lobes linear, apically acute to emarginate, 1-nerved, basally auriculate or entire; stamens 2–5, the anthers oblong, 0.2–0.4 mm. long, the filaments 1–2 mm. long; ovary at anthesis subglobose, longer than the style, the style bifid or trifid about half its length; capsule 1.5–2.8 mm. long (2–) 4–20-seeded, the seeds cochleate, 0.5–0.8 mm. broad, minutely but regularly tuberculate, the dorsal tubercles domical, the facial tubercles rectanguloid or lineolate, remote. Fig. 16D (Holotype *D. leptoclados*); Fig. 16E (Holotype *D. fendleri*).

Baja California; Arizona through western South America along the Andes to Argentina; apparently skipping southern Central America.

Fosberg (in Contr. U. S. Nat. Herb. 29:96. 1945) recognizes three varieties of *D. glandulosa*, a variable species indeed. The varieties are separated on basis of varying vegetative characters, var. *fendleri* having subglabrous leaves and var. *perennis* being perennial. Var. *fendleri* also tends to have cinereous less cordate leaves and more dense inflorescences. Although the type of *D. glandulosa* was described as being an annual, the root is apparently perennial and nearly 3 mm. thick. Since the perennial habit occurs in both the subglabrous and the densely pubescent forms and all possible combinations of the characters can be found throughout the range of the species I see little reason for their recognition.

Some of the forms are only with difficulty separated from *D. cordata*, but the seeds of the two have markedly different sculpture. *Drymaria glandulosa* is also marked by longer anthers and proportionately longer inner sepals, and the inflorescence is more obviously cymose with a conspicuous central leader. The perennial habit, frequently encountered in *D. glandulosa*, is rarely if ever encountered in *D. cordata*.

Mandon 950 from the Andes of Bolivia (2600–2700 m.) dept. Larecaja, referred tentatively by Ball (Kew Bull. 22:32) to *D. leptoclados* var. *peruviana* is obviously *D. glandulosa*, and in its tendency toward glabrescence it does resemble *D. leptoclados*.

Berlandier 999 and 1122 from Mexico are distinctive in that the petals have plicately-nerved veins and subcylindric tubercles thus suggesting intergression with a member of the Series *VILLOSA*.

45b. *DRYMARIA GLANDULOSA* var. *galeottiana* (Briq.) J. Duke comb. & stat. nov.

*Drymaria galeottiana* Briq. in Ann. Conserv. & Jard. Bot. Gen. 13:373. 1911. (HOLOTYPE: Galeotti 4408; near Oaxaca, Mexico, G1; isotypes at K [sub 4416] and L.)

Rather delicate erect annuals to as much as 20 cm. high, the internodes mostly longer than the leaves, glandular-puberulent, the roots fusiform. Leaves opposite, the blades glandular-puberulent and glabrescent, broadly ovate to reniform, apically obtuse and apiculate, marginally entire, basally truncate to subcordate, subsessile, the stipules bifid or trifid, 1–2 mm. long, about equaling the petioles. Flowers obconic, in rather dense terminal cymes, the peduncles 1–2 cm. long, glandular-puberulent; bracts ovate, aristate to acuminate, 1.5–2.0 mm. long, about equaling all but the central pedicels which may be up to 6 mm. long. Sepals 5, subequal, glandular-puberulent, 3.0–3.6 mm. long, 1.5–2.8 mm. broad, ovate to broadly oblong, 3-nerved, the midrib sometimes prominent and excurrent, the inner sepals obtuse, the outer acute, transparent save for the nerves; petals 5, 2.5–3.2 mm. long, bifid ca. half their length, the lobes oblong, obtuse, 2–4-nerved, tapering gradually to the claw, exappendiculate; stamens 3–5, 1.5–2.2 mm. long, the anthers suborbicular, 0.2–0.3 mm. long; ovary at anthesis subglobose, the style ca. 1 mm. long, trifid ca. half its length. Mature capsule subglobose, 2.5–3.0 mm. long, many-seeded, the seeds cochleate, about as long as broad, ca. 0.6 mm. broad, the dorsal tubercles low and domical, the facial tubercles rectangular, somewhat remote. Fig. 16A (Holotype).

Known only from few scattered collections in Oaxaca and Hidalgo, Mexico.

At Kew, the specimen labeled 4416 is called *D. galeottiana* and that labeled 4408 is called *D. nummularia*, so apparently the labels have been crossed. This variety is a misfit in this series because of the petal nervation and it may prove to represent a mere hybrid. The seeds, sepals, and pubescence suggest *D. glandulosa* whereas the nervation of the petals and to some extent their shape and size, recall *D. laxiflora*. These two are the most likely candidates for the parents if indeed the plant is a hybrid.

46. *DRYMARIA XEROPHYLLA* A. Gray, Pl. Wright. 2:18. 1852. (HOLOTYPE: Coulter 722).

Ascending perennials profusely branched from the base, the internodes longer or shorter than the leaves, glabrous. Leaves opposite, the blades broadly to narrowly ovate, glabrous, strongly 3–7-nerved, 5–10 mm. long, 3–10 mm. broad, apically acute and apiculate, marginally entire, basally rounded to obtuse, subsessile; the stipules lacerate, the divisions lance-linear to filiform, exceeding the petioles. Inflorescences of dense axillary cymes, or fascicles, the lanceolate acuminate bracts longer than the glabrous peduncles and pedicels, 1.5–2.5 mm. long. Sepals 5, oblong, apically acute to obtuse, strongly 3-nerved with the nerves subapically confluent, basally umbonate, 3–4 mm. long, glabrous to scantily stipitate-glandular; petals 3–5, entire and ligulate or bifid for half their length, the lobes apically



Fig. 17: *D. xerophylla*; sepal, 15 $\times$ ; petal, 15 $\times$ ; seed, 15 $\times$ ; habit,  $\frac{1}{2}\times$ .

denticulate or entire, 1-nerved, 1.0–1.8 mm. long; stamens 3, ca. 1 mm. long, the anthers oblong, the filaments basally connate into a shallow cup; ovary at anthesis subglobose, the style about as long, bifid or trifid about half its length. Capsule ellipsoid, 3-valved, 1–3-seeded, the seeds cochleate, 0.7–0.8 mm. broad, minutely tuberculate or merely reticulate on the facies. Fig. 17.

San Luis Potosí to Oaxaca, Mexico.

47. *DRYMARIA LADEWII* Rusby, in *Phytologia* 1:54. 1934. (HOLOTYPE: G. H. H. Tate 652: Bolivia; Nequejahuirá; alt. 8000 ft. NY!)

*Drymaria hypericifolia* Auct. Am. non Briq.

Diffusely spreading annuals or perennials, the internodes much longer than the leaves, strongly divaricate, viscid-puberulent. Leaves opposite, the blades glabrous,



deltoid-ovate, apically rounded to acute and apiculate, marginally entire, basally more or less truncate; stipules entire, more or less lanceolate; larger leaves to 2.8 cm. long, 2.5 cm. broad, trinerve, with the secondary veins forming an obvious but interrupted reticulum, the leaves as the rather long petioles strongly reduced upwardly. Inflorescences of terminal and axillary 5-many-flowered cymes, the axes glandular-puberulent, the bracts lanceolate, 1.5–3.0 mm. long, exceeded by the long, divaricate pedicels, the pedicels to 12 mm. long. Sepals 5, lance-oblong, 2–3 mm. long, apically obtuse or acute by extension of the midrib, weakly 1–3 nerved, the midrib often distally subcyanic; petals 5, about equaling the sepals in length, bifid about three-fourths their length, the lobes obtuse, exauriculate, subdivaricate, weakly 2–5-nerved, the claw carinose, subcylindric; stamens 5; 1.5–2.5 mm. long, the oblong anthers ca. 0.5 mm. long, the filaments basally connate into a more or less carinose ring; ovary at anthesis turbinate, the style trifid ca. half its length, about attaining the anthers. Capsule turbinate, 3-valved, included (seeds rarely mature in the specimens at hand), 1–5-seeded, the seeds similar to those of *D. cordata*. Fig. 18A.

Southern Mexico, Guatemala, Bolivia.

After scrutiny of the copious Guatemalan material and the scanty Bolivian material (2 specimens, one from the O. Kuntze herbarium, the other the type; [the second specimen cited by Rusby, in his description of the species, apparently is a hybrid with *D. cordata* or some related species and must be excluded from *D. ladewii*]), I am unable to find the slightest differences between them. Asserting rather strongly that there is no obvious difference between the Guatemalan and Bolivian material, I am quite at a loss to explain the peculiar disjunction exhibited by this species.

- 48a. *DRYMARIA CORDATA* (L.) Willd. ex Roem. & Schult. Syst. Veg. 5:406. 1819.  
(LECTOTYPE after Mizushima: Linnaean Herbarium specimen no. 109-1; LINN n. v.)

*Holostium cordatum* L. Sp. Pl. 88. 1753.

*Holostium diandrum* Sw. Prodr. 27. 1788. (HOLOTYPE: habitat in Jamaica, S!)

*Drymaria diandra* MacFadyen, Fl. Jam. 1:52. 1837. not Blume, 1825.

*Drymaria cordata*  $\beta$  *diandra* (Sw.) Griseb. Fl. Brit. W. Ind. 56. 1859.

*Drymaria cordata*  $\beta$  *puberula* Tr. & Pl. in Ann. Sci. Nat. 4<sup>17</sup>:148. 1862. (HOLOTYPE: *Triana s. n.*; Bogota alt. 2600 m., P, n. v.; isotype at NY!)

*Drymaria procumbens* J. N. Rose, in Contr. U. S. Nat. Herb. 1:304. 1895. (HOLOTYPE: Palmer 1165, near water about Colima, Mex., US!; isotype at GH)

*Drymaria adenophora* Urban, in Fedde, Repert. Sp. Nov. 21:213. 1925. (HOLOTYPE: Ekman 12978, Cuba, prov. Pinar del Río prope Cortez, B?; isotype at G, S, NY!)

*Stellaria adenophora* (Urb.) León in León & Alain, Flora de Cuba 2:154. 1950.

*Drymaria cordata* var. *pacifica* Mizushima, in Jour. Jap. Bot. 32:78. 1957. (HOLOTYPE: Svenson 65; Academy Bay, Indefatigable Island, Galapagos Islands, 100 ft. alt.; GH!)

Glandular-puberulent to glabrate ramifying annuals, prostrate and spreading or erect, the internodes mostly longer than the leaves, glabrous to densely glandular, often rooting at the nodes. Leaves glabrous to scantily puberulent, orbicular to reniform, apically rounded and occasionally mucronulate, basally rounded to cordate, 5–25 mm. long, 5–30 mm. broad, the petioles 2–15 mm. long; stipules mostly lacerate, rather persistent, to 2 mm. long. Inflorescences of terminal or

axillary few-many-flowered dichasial cymes, (flowers rarely solitary in the axils) the bracteate pedicels locally girdled with a dense band of glandular pubescence, rarely subglabrous, 2–15 mm. long, much exceeding the subtending bracts. Sepals 5, lanceolate to ovate, acute, glandular-puberulent to glabrous, obscurely to strongly 3-nerved, 2.5–4.0 (–5.0) mm. long, the borders translucent; petals 5, 2–3 mm. long, deeply bifid, the lobes linear, acute, rarely obtuse, 1-nerved, basally exauriculate but rarely subdentate; stamens 2–3 (–5), the flattened filaments 2.0–2.5 mm. long, the anthers suborbicular, 0.2–0.3 mm. long; style 0.5–1.0 mm. long, bifid or



Fig. 18: A. *D. ladewii*; sepal, 10 $\times$ ; petal, 10 $\times$ ; androecium, ca. 10 $\times$ ; seed, 15 $\times$ ; habit,  $\frac{1}{2}\times$ . B. *D. cordata* ssp. *cordata* (holotype of var. *pacifica*); petal, 10 $\times$ ; sepal, 10 $\times$ ; seed, 15 $\times$ . C. *D. cordata* ssp. *cordata* (holotype of *D. procumbens*); aberrant petal, 7 $\frac{1}{2}\times$ ; normal petal, 7 $\frac{1}{2}\times$ ; sepal, 7 $\frac{1}{2}\times$ ; seed, 15 $\times$ . D. *D. cordata* ssp. *diandra* (type of *D. retusa* ?); petal, 12 $\frac{1}{2}\times$ ; sepal, 12 $\frac{1}{2}\times$ . E. *D. cordata* ssp. *diandra* (lectotype); petal, 10 $\times$ ; sepals, 10 $\times$ .

trifid from half to its entire length; ovules few to many, campylotropous on free central placentae. Capsule ovoid, 1.5–2.5 mm. long, the 3 valves entire; seeds 1–many, 1.0–1.5 mm. broad, cochleate, dark reddish brown, tuberculate in lines, all the tubercles low and domical, closely approximated or contiguous. Fig. 18B (Holotype of var. *pacifica*); Fig. 18C (Holotype of *D. procumbens*).

A nearly pantropical species, in America ranging from Florida and Mexico through the West Indies and Central America to Argentina.

Mizushima (in Jour. Jap. Bot. 32:69. 1957), studying the varietal potentials of this polymorphic species, described var. *pacifica*, which differs from typical *cordata* in having glabrous sepals, more seeds, and a tendency to have a greater number of stamens and the styles divided completely to the ovary. This rather striking variety seems to be lacking in continental North America. Occuring in both var. *pacifica* and var. *puberula*, for those who wish to recognize them, are variants in which the flowers are subsolitary in the axils (e.g. Holton 733 from Colombia). Surprisingly and fittingly these have as yet received no taxonomic status. *Drymaria adenophora* Urban represents a more or less viscid form with diminutive leaves and flowers and apparently is very similar to specimen 109-1 in the Linnaean herbarium. A similar reduction is exhibited by the type of *Holosteum diandrum* Sw. generously loaned by Stockholm. *Mosen 405* at Lund from Brazil with the sepals to as much as 5.2 mm. long represents the opposite extreme of *D. adenophora*, which I believe is typical *D. cordata*.

Perhaps the strangest aberration is that represented by the flowers of the type of *D. procumbens*, here considered to represent only a monstrosity. The petals are bilobed but one of the lobes is clearly staminal in nature (see Fig. 18C), the other lobe being normal and petaloid. I have seen a similar aberration in one specimen of *D. paposana* var. *weberbaueri*, perhaps lending weight to Pax's interpretation of the petals as staminodia.

48b. *DRYMARIA CORDATA* ssp. *diandra* (Blume) J. Duke comb. & stat. nov.

*Drymaria diandra* Blume, Bidjr. Fl. Nederl. Ind. 62. 1825. (LECTOTYPE: after Mizushima, sect. 99, 143–199 at L!)

*Drymaria retusa* Wallich, ex Wight & Arnott, Prodr. Fl. Ind. Or. 359. 1834. as synonym. (? TYPE?: Wight 152, G, L, !)

*Drymaria cordata* forma *indica* Miquel, in Junghuhn, Pl. Jungh. 395. 1855.

*Drymaria extensa* Wallich, ex Edgeworth, & Hook. f. in Hook. f. Fl. Brit. Ind. 1<sup>2</sup>:244. 1874. (? TYPE?: Wallich 647, G!)

*Drymaria gerontogea* F. Muller, Descr. Papuan Pl. 1:87. 1877.

Prostrate or ascending annuals, the internodes longer than the leaves, glabrous to stipitate-glandular. Leaves opposite, the blades glabrous, rarely minutely puberulent, deltoid-ovate to orbicular or subreniform, apically rounded and often apiculate, marginally entire, basally truncate to obtuse, rarely cordate, 5–25 mm. long, 3–20 mm. broad, 3–7-nerved; the petioles 2–8 mm. long usually exceeding the stipules; the stipules lacerate, the segments filiform, 1–3 mm. long. Inflorescence a terminal lax to dense 3–many-flowered cyme, the peduncles 1–12 cm. long, glabrous or glandular-puberulent; bracts lanceolate, 2–5 mm. long; pedicels evenly glandular-puberulent; 1–8 mm. long. Sepals 5, narrowly obovate, 2.0–4.5 mm. long, the outer glandular-puberulent, strongly carinate, strongly three-ribbed, the

ribs protrusive and often connected by cross-veins; petals 3-5, 1.5-3.0 mm. long, bifid one-half to two-thirds their length, the lobes oblong, 1-nerved, apically obtuse to emarginate, basally tapered to the linear claw. Stamens 2-3 (-4), 1.6-2.2 mm. long, the anthers suborbicular, the filaments basally connate into a shallow cup (the cup often carinose in African forms). Ovary at anthesis globose, the styles short, bifid or trifid from half to all their length. Capsule 2-3-valved, 1.5-2.5 mm. long, 1-2-seeded, the seeds cochleate, 1.4-2.0 mm. broad, rather densely tuberculate. Fig. 18D (type of *D. retusa* ?); Fig. 18E (lectotype of *D. diandra*).

Tropical Africa, Australia, and Tropical Asia (China, S. & W.; India, Indochina, Malaysia, Formosa, Ryukyu Archipelago), Oceania, Hawaii, Philippines, New Guinea, Celebes.

Mizushima (in Journ. Jap. Bot. 32:69. 1957), after a detailed study of the variation of *D. cordata*, reinstated *D. diandra*, long lost in synonymy under *D. cordata*, to specific status. Intermediates do occur between the two, especially in Africa. The absence of the taxon from the New World when weighed with the characters enumerated in the key, none of them invariably constant, suggest that reduction to a subspecies more truly reflects the hierarchical relationships.

African forms are very perplexing and differ from the typical material in the large sepals and petals, higher number of stamens, with prominent, often carinose, staminodial cups. The flowers often lack the pyriform shape which so frequently differentiates ssp. *diandra* from ssp. *cordata*. Description of these variants as formal taxa would seem to serve no purpose.

#### SPECIES EXCLUDENDAE

- D. filiformis* Benth. = *Stellaria filiformis* (Benth.) Mattf.  
*D. idiopoda* S. F. Blake = *Stellaria* sp.  
*D. mairei* Leville = *Cerastium* sp.  
*D. palmeri* Hemsl. = *Stellaria* sp.  
*D. rotundifolia* Harriot = *Stellaria rotundifolia* Poir. fide Kew Index

#### SPECIES NON SATIS. NOTAE

- D. adiantoides* Muschl. (TYPE: Sodiro 1291) EX CHAR. = *D. villosa*?  
*D. grandiflora* Schlecht. non Bartl. May be *Stellaria*?  
*D. megalantha* Steud. " "  
*D. oxalidea* Pax (TYPE: Schaffner 827) EX CHAR. VEG. = *D. excisa*???  
*D. peruviana* Muschl. (TYPE: Weberbauer 2601) EX CHAR. VEG. = *D. divaricata*?  
*D. sessiliflora* Fiori (Descr. non viso) EX GEOGR. = *D. cordata*

#### COMBINATIONES ET TAXA NOVAE

- D. holosteoides* var. *crassifolia* (Benth.) J. Duke  
*D. arenarioides* ssp. *peninsularis* (S. F. Blake) J. Duke  
*D. barkleyi* J. Duke & Steyermark  
*D. conzatti* J. Duke  
*D. effusa* var. *confusa* (J. N. Rose) J. Duke

- D. effusa* var. *depressa* (E. L. Greene) J. Duke  
*D. leptophylla* var. *cognata* (S. F. Blake) J. Duke  
*D. leptophylla* var. *nodosa* (Engelm.) J. Duke  
*D. engleriana* var. *devia* (Baehni & MacBride) J. Duke  
*D. villosa* ssp. *palustris* (Cham. & Schlecht.) J. Duke  
*D. villosa* ssp. *palustris* forma *townsendii* (Robins.) J. Duke  
*D. villosa* ssp. *palustris* var. *perennis* J. Duke  
*D. villosa* ssp. *villosa* forma *tepicana* (M. E. Jones) J. Duke  
*D. villosa* ssp. *paramorum* (S. F. Blake) J. Duke  
*D. paposana* var. *serrulata* J. Duke  
*D. paposana* var. *weberbaueri* (Muschl.) J. Duke  
*D. rotundifolia* var. *nitida* (J. Ball) J. Duke  
*D. divaricata* var. *stricta* (Rusby) J. Duke  
*D. divaricata* var. *viscidula* (A. Gray) J. Duke  
*D. divaricata* var. *divergens* J. Duke  
*D. divaricata* var. *reflexiflora* J. Duke  
*D. gracilis* ssp. *carinata* (Brandege) J. Duke  
*D. glandulosa* var. *galeottiana* (Briq.) J. Duke  
*D. cordata* ssp. *diandra* (Blume) J. Duke

## CITATION OF SPECIMENS

## U. S. A.

- |   |                                   |
|---|-----------------------------------|
| D. CORDATA (L.) Willd.                        | Gould & Haskell 4050              |
| Fredholm 6487                                 | Green 12599                       |
| Godfrey, R. K. 58025                          | Hanson & Hanson A962              |
| McFarlin, J. B. 3192                          | Harrison & Kearney 6104           |
| Reese, W. D. 1506                             | Hinckley 500                      |
| Schallert, P. O. 7500                         | Jones, M. E. 96; 28677            |
| Small, J. K. 12761                            | Metcalf 793, 1378                 |
| Small, Britton & DeWinkeler 9310              | Mulford 1187                      |
| Small, Mosier & DeWinkeler 10836              | Purpus 8147                       |
| Steyermark, J. 63326                          | Rose & Fitch 17647                |
|   | Rusby 42                          |
| D. EFFUSA var. EFFUSA                         | Shreve 7768                       |
| Blumer 1639; 3368 (appr. <i>leptophylla</i> ) | Standley 14047                    |
| Harrison & Kearney 8088                       | Wooton 641                        |
| Lemmon 509; 2644                              | Wright 866                        |
| Rothrock 169; 619                             |                                   |
| Wright 869 (TYPE)                             |                                   |
| D. EFFUSA var. DEPRESSA (Greene)              | D. LAXIFLORA Benth.               |
| J. Duke                                       | Cory 30590                        |
| Gould & Robinson 4961                         | Hinckley 321, 357, 2847           |
| Metcalf 1428 (aber.); 1430 (TYPE)             | Innes & Moon 1136                 |
| Neally 251                                    | Moore & Steyermark 3044           |
|   | Warnock W812                      |
| D. GLANDULOSA Presl                           | D. LEPTOPHYLLA (Cham. & Schlecht) |
| Arséne 19280; 21665                           | Fenzl ex Rohrb.                   |
| Barkley 14NM715                               | Arséne 19375                      |
| Earle & Earle 460                             | Blumer 1411                       |
| Eggleston 16381; 16469a                       | Cory 30375                        |
| Fendler 60 (TYPE: <i>D. fendleri</i> )        | Darrow 3517                       |
|   | Darrow et al. 1485                |

Fendler 56  
 Greene 332; 12778  
 Harrison & Kearney 6187  
 Hinckley 1290  
 Metcalfe 527 (appr. *effusa*)  
 Purpus 8150  
 Rusby 41  
 Standley 13932  
 Wright, C. 868

D. MOLLUGINEA (Lag.) Didr.

Arsène 18596; 19073  
 Blumer 1433; 2100; 3583  
 Eggleston 10943; 15989  
 Ellis 405  
 Fendler 55 (TYPE: *D. sperguloides*)  
 Fulton 7368  
 Gould 3962  
 Gould & Haskell 4049  
 Greene 12600

Hanson & Hanson 952  
 Harrison, Kearney & Hastings 6228; 8092  
 Kearney & Peebles 10042; 12723  
 Lemmon 3002  
 Metcalfe 349; 1424  
 Mulford 806  
 Parker & McClintock 7509  
 Purpus 8148  
 Rusby 40  
 Standley 14212  
 Wooton 593  
 Wright 867

D. PACHYPHYLLA Woot. & Standl.

Cory 30793  
 Eggleston 19345; 19353  
 Havard 118  
 Hershey 3012  
 Hinckley 3522  
 Wooton 405 (TYPE)

MEXICO (Continental)

D. ANOMALA S. Watson

Bell & Duke 16581  
 Johnston & Muller 622A  
 Palmer 358; 700  
 Pringle 2847 (TYPE); 3278  
 Stanford, Retherford & Northcraft 485

D. ARENARIOIDES Humb. & Bonpl. ex Roem. & Schult.

Bonpland 4070 (TYPE?)  
 Coulter 698  
 Kenoyer 1882, 2447  
 Kirkwood 210  
 LeSueur 467, 622  
 Lundell 5351  
 Moore, H. E. 1566  
 Muller, C. H. 3342  
 Parry & Palmer 49  
 Pringle 236, 518, 715, 3539; 7589; 7927  
 Purpus 133, 1123  
 Rose, Painter & Rose 8719  
 Schaffner 139, 541  
 Shreve 6673; 7322; 9205  
 Thurber 815  
 White, S. S. 2477  
 Wiggins 7235

D. AXILLARIS Brandege

Purpus 4526 (TYPE)

D. BARKLEYI J. Duke & Steyermark

Hernandez, Rowell & Barkley 16M531  
 Warnock & Barkley 14826M (TYPE)

D. CONZATTII J. Duke

Conzatti 1688 (TYPE)

D. CORDATA (L.) Willd.

Berlandier 1217  
 Ervendberg 228  
 Hinton 7442 (var. *pacifica*)  
 Karwinsky 29  
 Kerber 70, 180  
 Martinez-Calderon 408  
 Matuda 2287  
 Mexia 1309  
 Palmer 1165 (TYPE: *D. procumbens*)  
 Pringle 11805  
 Rovirosa 328  
 Seaton 477

D. EFFUSA var. EFFUSA

Thurber 995

D. EFFUSA var. DEPRESSA (Greene) J. Duke

Barkley, Rowell & Westlund 77  
 Nelson 4892  
 Orcutt, 3729, 3724  
 Ortenburger, Paxton & Barkley 16M699  
 Pringle 6480  
 Reiche 811  
 Rose 2156 (appr. var. *confusa*)  
 Rose & Hay 6243  
 Rose & Painter 7037; 7206; 7914

D. EFFUSA var. CONFUSA (Rose) J. Duke

Knobloch 1298  
 Maysilles 7773-A, 7441  
 Nelson 4813  
 Palmer 59 (TYPE)

D. ELATA I. M. Johnston

Johnston 7823 (TYPE)



- Purpus 4496  
Stewart 2651
- D. EXCISA Standl.  
Arsène 8450  
Hinton 508; 4919; 5074; 5427 (TYPE: *D. grandis*); 5429; 9007  
McVaugh 10153; 10247; 13421  
Mexia 1748 (TYPE)
- D. GLANDULOSA Presl  
Aguilar 1782  
Arsène 513; 595; 2295 (appr. *laxiflora*)  
Bartlett 10312  
Berlandier 677; 841; 1122; 1308  
Bourgeau 283; 552; 592a  
Chase 7216; 7354  
Drouet & Richards 3907  
Edwards 804B  
Gentry 1338  
Jones, M. E. 22845, 27050 (TYPE: *D. fendleri* var. *perennis*) 27051  
Kenoyer 1153  
MacDaniels 752  
McVaugh 16790  
Moore 1471; 3064  
Orcutt 4332; 4337  
Palmer 760  
Parry & Palmer 51  
Pringle 5089; 7122  
Purpus 430; 3311  
Rose & Hay 5511  
Rose & Painter 6617; 6775; 7083 (appr. var. *galeottiana*) 7735  
Rose, Standley & Russell 12697  
Rowell, Webster & Barkley 17M470  
Schaffner 130  
Schaumann 332b  
Seaton 476  
Sessé, Mociño et al. 446, 447, 1394?
- D. GLANDULOSA var. GALEOTTIANA (Briq.)  
J. Duke  
Galeotti 4408 (TYPE); 4418
- D. GRACILIS Cham. & Schlecht.  
Barnes & Land 665  
Botteri 349  
Botteri & Sumichrast 1567  
Bourgeau 2659  
Fischer 642, 643  
Loesener 138  
Matuda 0905  
Moore 2965  
Müller 720, 775; 879  
Rose & Hay 6114  
Rose & Hough 4939  
Smith, J. G. 360
- D. HYPERICIFOLIA Briq.  
Jurgenson 38 (TYPE)
- D. LADEWII Rusby  
Matuda 2008; 2283; 2994; 4000
- D. LAXIFLORA Benth.  
Arsène 1905; 5129  
Balls B4472  
Bartlett 10434  
Bell & Duke 16772  
Bourgeau 21, 2946  
Coulter 706 (appr. *gracilis*); 710  
Dugés 1880  
Fisher 44293  
Johnston 44293  
LeSueur 1321  
Lloyd 370  
Lundell 5095  
Marsh 871  
Meyer & Rogers 2493; 2526  
Moore 1489; 2033  
Mueller & Mueller 1117  
Orcutt 3910, 3915, 3929  
Ortenburger, Paxton & Barkley 16M682; 16M693; 16M747  
Palmer 253; 266  
Parry & Palmer 57  
Pringle 331 (TYPE: *D. chihuahuensis*) 4175; 6972  
Purpus 3310  
Rose 2789  
Rose & Hay 5510, 5676, 5973  
Rose & Painter 7148; 7207  
Rose, Painter & Rose 8449; 8488; 8773; 8882  
Rose, Standley & Russell 12796  
Rusby 361  
Schaffner 130 p. p.; 364; 366  
Schumann 332a  
Sessé, Mociño et al. 449; 468; 983  
Shreve 9039; 9302  
Stewart 2545  
Stewart & Johnston 2124  
Wynd & Mueller 620
- D. LEPTOPHYLLA (Cham. & Schlecht)  
Fenzl. ex Rohrb.  
Barlow 30  
Coulter 697  
Gentry 8474  
McVaugh 13105  
Palmer 497; 794  
Parry & Palmer 60  
Pringle 581; 1194; 6482  
Purpus 3734  
Rose 2690  
Rose & Painter 7132  
Schaffner 140; 388

- D. LEPTOPHYLLA var. COGNATA (S. F. Blake) J. Duke  
Maysilles 7545  
Palmer 912 (TYPE)  
Pennell 18819  
Schaffner 542 p. p.
- D. LEPTOPHYLLA var. NODOSA (Engelm.) J. Duke  
Gentry 571M; 1814; 2669 (TYPE: *D. gentryi*)  
Hartman 138  
Knobloch 5522; 5615  
LeSueur 258; 623 (sensu *gentryi*)  
Muller 3426  
Pringle 581; 716; 1195; 13506  
Rose & Painter 6668  
Schaffner 5  
Townsend & Barber 201 (sensu *gentryi*)  
Tucker 2457  
White 2366; 2557; 2733; 4185; 4403; 4776 (aber.)
- D. LONGEPEDUNCULATA S. Watson  
Hinton 1957; 11284  
McVaugh & Koelz 897  
Pringle 2121 (TYPE) 3594; 4348
- D. LYROPETALA I. M. Johnston  
Johnston 7064; 7513; 7594 (TYPE): 8352; 9347  
Johnston & Muller 241  
Marsh 1571  
Stewart 567 (TYPE: var. *coubaulana*)
- D. MALACHIOIDES Briq.  
Galeotti 4415 (TYPE)  
Hinton 15505 (?)  
Leavenworth 595 (?)
- D. MOLLUGINEA (Lag.) Didr.  
Arsène 1616  
Griffiths 6749  
Mearns 2248  
Pringle 1192; 1571; 6481  
Sessé, Mociño et al. 984  
White 970
- D. MULTIFLORA Brandegee  
Arsène 5309; 6710  
Gentry 6479  
Hinton 1549; 2596; 6578; 11538; 12167; 12489; 15050; 15263  
McVaugh 12962; 13441; 13442; 14066; 16524  
McVaugh & Koelz 1264  
Nelson 1787  
Purpus 1653 (TYPE)  
Rose & Painter 6517; 6773 p. p.; 6774; 7219
- Schaffner 51; 367  
Sessé, Mociño et al. 5005
- D. PACHYPHYLLA Woot. & Standl.  
Johnston 7684; 7790; 8009; 8925; 8335B  
Johnston & Muller 787; 1108; 1234  
Nelson 6375  
Orcutt 1325  
Pringle 5539  
Purpus 472; 4942  
Stewart 1161; 1745; 2956  
Waterfall 13281
- D. POLYCARPOIDES A. Gray  
Gregg s. n. (TYPE)  
Johnston 7344; 7841  
Johnston & Muller 335; 761  
Palmer 73  
Purpus 4498  
Stewart 814; 843; 1102; 1152; 1753
- D. STIPITATA Fosberg  
Muller 3301 (TYPE)  
Rozynski 100; 486  
Stewart 1093
- D. SUBUMBELLATA I. M. Johnston  
Johnston 8489 (TYPE)
- D. SUFFRUTICOSA A. Gray ex S. Watson  
Palmer 74 (TYPE)  
Stewart 2813; 2916
- D. TENUIS S. Watson  
Arsène 2587; 6651  
Berlandier 1177  
Bourgeau 553  
Kenoyer A-457  
McVaugh 16795; 17768  
Pringle 2120 (TYPE); 4096; 4536 (TYPE: var. *jalsicana*) 7648; 11928  
Schaffner 363; 416  
Seaton 267 (TYPE: *D. filiformis*)  
Sessé, Mociño et al. 448, 466; 467; 5184
- D. VILLOSA Cham. & Schlecht.  
Arsène 5129 p. p.; 5214; p. p.; 5281; 6810  
Bell & Duke 16648  
Botteri 350; 944  
Botteri & Sumichrast 568  
Feddemma 1095  
Fischer 2092  
Galeotti 1726; 4414  
Hinton 1384; 5152; 9471  
Jones, M. E. 22847 (TYPE: *D. tepicana*); 27051a (TYPE: *D. barrancae*)  
Leavenworth & Hoogstraal 1295  
Matuda 4752

- Müller 120; 575a  
 Orcutt 4614  
 Palmer 748; 945; 1166; 1602  
 Pringle 1196; 1572  
 Purpus 4440, 6303; 10229  
 Rose 2078  
 Rose & Painter 6967; 7436  
 Rose, Standley & Russell 14145 & 14386  
 (both f. *tepicana*)  
 Schiede & Deppe 505 (TYPE)  
 Seaton 32  
 Sezaya, Paxson & Barkley 16M833  
 Sumichrast 1568; 1945
- D. villosa* ssp. *palustris* (Cham. & Schlecht.) J. Duke  
 Arsène 16; 5191; 5391; 5416; 5911  
 Balls B4568; B5504  
 Barkley et al. 7489  
 Frye & Frye 2606  
 Galeotti 4416 (TYPE: *D. nummularia*)  
 Hinton 3304; 11851; 12233  
 Jones, M. E. 90 (TYPE: *D. subsessilis*)  
 LeSueur 1322 (f. *townsendii*)  
 Leavenworth 525  
 Maysilles 7782  
 McVaugh 13415; 16159  
 Moore 2801; 2955
- D. villosa* ssp. *palustris* var. *perennis* J. Duke  
 Edwards 804B  
 Johnston 8965  
 Kenoyer 2449 (appr. *laxiflora*)  
 Moore 1669  
 Palmer 187 (TYPE); 356  
 Pringle 3265
- D. xerophylla* A. Gray  
 Arsène 46  
 Coulter 722 (TYPE)  
 McVaugh 16793  
 Parry & Palmer 50  
 Pringle 6910  
 Purpus 3309  
 Rose et al. 9679  
 Schaffner 525  
 Sessé, Mocino et al. 5003
- BAJA CALIFORNIA
- D. arenarioides* ssp. *peninsularis* (S. F. Blake) J. Duke  
 Carter et al. 2257  
 Craig 738  
 Dawson 1189  
 Howell 10576  
 Johnston 3972 (TYPE: *D. johnstonii*)  
 Purpus 337; 423 (TYPE); 496  
 Rose 16357  
 Xantus 5
- D. debilis* Brandegee  
 Brandegee 35 (TYPE: *D. polystachya*;  
 s. n. Feb. 13, 1889 UC (TYPE)  
 Carter 2578  
 Carter & Ferris 3709; 3812; 4093  
 Carter & Kellogg 2922  
 Collins, Kearney & Kempton 157; 211  
 Dawson 1095  
 Gentry 3751  
 Palmer 4; 819 (TYPE: *D. diffusa*)  
 Rose 16609  
 Wiggins 11409
- D. glandulosa* Presl  
 Carter et al. 2379; 2447  
 Carter & Ferris 3774; 3907  
 Jones, M. E. 24149; 24190; 24191;  
 27050 (TYPE: *D. fendleri* var. *perennis*)  
 Purpus 469
- D. gracilis* ssp. *carinata* (Brandegee) J. Duke  
 Brandegee 34 (TYPE)  
 Gentry 4415 (TYPE: *D. carinata* var.  
*perennis*)  
 Jones, M. E. 24193  
 Purpus 216
- D. holosteoides* Benth.  
 Bryant 1888 (TYPE: *D. vetchii*)  
 Carter et al. 1935; 2474  
 Carter & Kellogg 3089; 3221  
 Chambers 837  
 Constance 3135  
 Gentry 4059; 7516  
 Hinds s. n. (TYPE)  
 Johnston 3048; 3949; 4263  
 Jones, M. E. 24076  
 Mason 1908  
 Palmer 570  
 Purpus 151  
 Reed 6156; 6255  
 Rose 16268; 16528  
 Shreve 7053; 7095  
 Wiggins 5456; 5531; 7898; 11350
- D. holosteoides* var. *crassifolia* (Benth.) J. Duke  
 Carter et al. 2255

Constance 3185  
 Craig 726  
 Hinds s. n. (TYPE)  
 Howell 10572  
 Jones, M. E. 27046  
 Moran 4168  
 Xantus 6

*D. viscosa* S. Watson  
 Dressler 599  
 Gentry 7359  
 Orcutt 51; 1330 (TYPE)  
 Palmer 767  
 Shreve 6950  
 Wiggins 7862

*D. LEPTOPHYLLA* (Cham. & Schlecht.)  
 Fenzl. ex Rohrb.  
 Wiggins & Demaree 4915

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*D. CORDATA* (L.) Willd.

Aguilar 193; 978  
 Calderón 266  
 Carlson 831  
 Chaves 319  
 Fendler 9  
 Gentle 3028  
 Glassman 1805  
 Grant 766  
 Mitchell 47  
 Muenscher 12352; 12475  
 Oersted 3640; 3649  
 Orozco 434; 436  
 Peck 519  
 Rodriguez, J. V. 2196  
 Rowlee & Rowlee 345; 500  
 Standley 1720; 2300; 7691; 8588; 8921;  
 17158; 17541; 19236; 20236; 21557;  
 22502; 22650; 22714; 23493; 24022;  
 44268; 53336; 66994; 72489; 75828;  
 76914; 87923; 88760; 89508  
 Standley & Elias 2542; 2687  
 Standley & Jaime 5633; 7197  
 Steyermark 38793; 47853  
 Stork 8; 1065  
 Tonduz 11431  
 Valerio 187  
 Velasco 8893  
 von Wedel 1249A  
 Watson 20  
 Wilson 554  
 Yuncker 4770

*D. EFFUSA* var. *DEPRESSA* (Greene) J. Duke  
 Steyermark 50243 (TYPE: *D. minuscula*)

*D. GLANDULOSA* Presl

Bernoulli 240 (TYPE: *D. leptoclados*)  
 Standley 58053; 59111; 59852; 60343;  
 60837; 60874; 60893; 61235; 62818;  
 62897; 63790; 64317 p. p.; 64427;  
 66095; 66170; 67287; 77390; 80085;  
 80810; 81211; 81909; 82454; 83002;  
 83193; 83247; 83512; 83884; 84704;  
 85793

Steyermark 32299; 33991

*D. LADEWII* Rusby

Heyde & Lux 4444  
 Hunnewell 14660  
 Nelson 3706  
 Stanley 58398; 59961; 61978; 65477;  
 67942; 68554; 80175; 80683; 83275;  
 83294; 83823; 85147; 85599; 85827;  
 86254  
 Steyermark 30047; 32349; 33964; 35653;  
 36187

*D. LAXIFLORA* Benth.

Bernoulli & Cario 3255  
 Hartweg 523 (TYPE)  
 Steyermark 35768

*D. MULTIFLORA* Brandegee

Bell & Duke 16975  
 Skutch 2992  
 Standley 59446; 65172; 79941; 80208  
 Steyermark 30500

*D. VILLOSA* Cham. & Schlecht.

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 Bell & Duke 16971  
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 Johnston 104  
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 Rowlee & Rowlee 132a  
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Standley 1897; 11000; 11873; 12155;  
12330; 13284; 13324; 15488; 21136  
p. p.; 20257; 21730; 21786; 21827;  
22048; 22194; 22651; 22713; 22715;  
23256; 24551; 25023; 29145; 56318;  
58372; 59854; 60848; 61657; 62849;  
64283; 64426; 65793; 69598; 71912;  
76602; 78213; 80809; 81050; 82240;  
83258; 91341

Standley, Allen et al. 919

Standley & Elías 2533

Standley & Jaime 6748; 6926 p. p.

Standley & Lindell 7469

Standley, Williams et al. 1225

Steyermark 29615; 29910; 35044 p. p.;  
50528

Tonduz 749

von Tuerckheim 684 (appr. *D. malachi-*  
*oides*)

Williams & Molina 10076; 12016

Woodson, Allen & Seibert 1162; 1771  
p. p.

Woodson & Schery 710

Yuncker, Dawson & Youse 5856

#### D. VILLOSA ssp. PALUSTRIS

(Cham. & Schlecht.) J. Duke

Muenschner 12428

Skutch 298

Standley 61036; 61054; 61553; 62663;

62855; 62969; 64316; 64697; 64709;

65915; 67816; 82677; 83746; 85203;

85816; 87192

Standley & Elías 3170; 3649

Standley & Jaime 5503

Steyermark 34454; 35044 p. p.; 35597;

35735; 50126; 50314

#### WEST INDIES

##### D. CORDATA (L.) Willd.

Baker 1375

Baker & van Hermann 4246

Boldingh 1670; 2306

Box 985

Britton 2287; 3303

Britton & Cowell 131; 12790

Britton & Hazen 27

Britton & Hess 2837

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Cowell 776

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Duss 1779; 3092

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Ekman 612; 9469; 12798 (TYPE: *D.*  
*adenophora*); 13871

Fuertes 1323; 1404

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Heller 4577

Heller & Heller 175; 526A

Hodge 438; 439; 440; 2460

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León & Clement 6446

Leonard 8347; 9217

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Rose, Fitch & Russell 3492

Shafer 53; 208; 523; 13737

Sieber 270; 392

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Thompson 7958

van Hermann 15; 254

Wight 99

Wilson 1166

Wilson & Leon 11625

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Wright, Parry & Brummell 2

##### D. ORTEGIOIDES Griseb.

Britton, Britton & Wilson 14279

Curtiss 397

Wright 2019 (TYPE)

## VENEZUELA

*D. CORDATA* (L.) Willd.

Bonpland 222  
 Broadway 575  
 Farenholtz 554; 665 (var. *pacifica*)  
 Fendler 48  
 Lasser 1611  
 Mocquery 964  
 Pittier 9458; 9827; 11431  
 Vogl 253; 324

*D. FIRMULA* Steyermark

Steyermark 56536 (TYPE)

*D. VILLOSA* Cham. & Schlecht.

Farenholtz 795  
 Pittier 12672

*D. VILLOSA* ssp. *PARAMORUM* (S. F. Blake)

J. Duke  
 Jahn 111 (TYPE)  
 Pittier 13170

## COLOMBIA

*D. CORDATA* (L.) Willd.

André 747 (p. p.)  
 Allen, C. 468  
 Cuatrecasas 11000; 12904  
 Cuatrecasas, Schultes & Smith 12217  
 Fosberg 19276; 19491, 20367  
 Gutiérrez & Barkley 17C529  
 Killip 5358 p. p.  
 Killip & Smith 17425 (aber.)  
 Lehmann 5997 (var. *pacifica*)  
 Pennell 1563  
 Pring 63  
 Rusby & Pennell 283; 501  
 Schiefer 625  
 Toro 15  
 Triana s. n. (TYPE: var. *puberula*)  
 von Sneider 2256

*D. GLANDULOSA* Presl

Apollinaire 24

*D. OVATA* Humb. & Bonpl. ex Roem. & Schult.

André 747 p. p.; 2778; 5865; 6112;  
 6384  
 Arbeláez & Cuatrecasas 6001  
 Pennell 7133; 7139; 7621; 8914  
 Rusby & Pennell 622

*D. VILLOSA* Cham. & Schlecht.

André 4289 (appr. ssp. *palustris*)  
 Arbeláez & Cuatrecasas 5260  
 Killip & Smith 16142 p. p.; 17073  
 Pennell 1733; 3244  
 Smith, H. H. 556 (appr. ssp. *palustris*);  
 2830

*D. VILLOSA* ssp. *PALUSTRIS*

(Cham. & Schlecht.) J. Duke  
 Killip 5358 p. p.; 6732  
 Killip & Smith 16142 p. p.  
 Rusby & Pennell 644

*D. VILLOSA* ssp. *PARAMORUM*

(S. F. Blake) J. Duke  
 Fosberg 21491

## ECUADOR

*D. CORDATA* (L.) Willd.

Eggers 14659; 15170 (var. *pacifica*)  
 Jameson 171

*D. OVATA* Humb. & Bonpl. ex Roem. & Schult.

André 3653  
 Benoist 2367 (aber.)  
 Camp 2576; 2620  
 Espinosa 199  
 Fosberg 22419; 22528  
 Fosberg & Giles 22888; 23225 (appr. *D. villosa* ssp. *paramorum*)  
 Fosberg & Prieto 22689 p. p.; 22789  
 Jameson 308  
 Penland 46  
 Rose, Pachano & Rose 23875 p. p.  
 Rose & Rose 22227; 23542  
 Spruce 6539  
 Tate 559; 595; 610  
 Wagner 13

*D. ROTUNDIFOLIA* var. *NITIDA* (J. Ball) J. Duke

André 3978 (appr. *D. glaberrima*)

*D. STELLARIOIDES* Humb. & Bonpl. ex Roem. & Schult.

Camp E-1862  
 Fosberg 23203  
 Hitchcock 21406  
 Jameson 100  
 Pachano 95  
 Rose, Pachano & Rose 22952; 23183 p. p.  
 Rose & Rose 22805

*D. VILLOSA* Cham. & Schlecht.

André 1988

*D. VILLOSA* ssp. *PALUSTRIS*

(Cham. & Schlecht.) J. Duke  
 Benoist 77  
 Camp E-1929; E-2624  
 Fosberg & Prieto 22689 p. p.  
 Rose, Pachano & Rose 23183 p. p.;  
 23875 p. p.



## GALAPAGOS ISLANDS

*D. CORDATA* (L.) Willd.

Baur 3  
 Howell 9158; 9671  
 Stewart 1513; 1514; 1515; 1516; 1517  
 Svenson 65 (TYPE: var. *pacifica*); 134  
 (var. *pacifica*)

*D. MONTICOLA* Howell

Bowman 77  
 Howell 9243 (TYPE)

*D. ROTUNDIFOLIA* A. Gray

Stewart 1512 (var. *nitida* ???)

## PERU

*D. APETALA* Bartl.

Pavón s. n. (TYPE: *D. virgata*)  
 Pennell 14321  
 Soukup 2823  
 Weberbauer 5814; 5827  
 Wilkes Exped. s. n. (TYPE: *D. macrantha*)

*D. AURICULIPETALA* Mattf.

MacBride & Featherstone 2264 (TYPE)

*D. CORDATA* (L.) Willd.

Gay 899  
 Ferreyra 255; 1064; 1758; 11305; 12726;  
 12753  
 Hunnewell 15972  
 MacBride 3918  
 Nuñez, O. V. 727  
 Weberbauer 6543

*D. DIVARICATA* HBK?

Ferreyra 3460  
 Martínez 240  
 Pennell 14560

*D. DIVARICATA* var. *DIVERGENS* J. Duke

Asplund, E. 13731  
 Ferreyra 1724  
 Nuñez 2320, 4189 p. p.

*D. DIVARICATA* var. *REFLEXIFLORA* J. Duke

Ferreyra 3855 p. p.; 3958; 8695a; 11522  
 Nuñez 2261; 3579; 3754; 3752; 3755;  
 3757; 3758; 4198; 4291

*D. DIVARICATA* var. *STRICTA* (Rusby) J. Duke

Ferreyra 763 (appr. *D. glaberrima*);  
 1497  
 Lechler 1947 (TYPE: *D. agapatensis*)  
 Weberbauer 5327 (appr. *D. glaberrima*)

*D. DIVARICATA* var. *VISCIDULA* (A. Gray) J. Duke

Ferreyra 6102  
 MacBride & Featherstone 189?  
 Pennell 14518, 14516  
 Stork 11456  
 Weberbauer 10143  
 Wilkes Exped. s. n. (TYPE)

*D. ENGLERIANA* (Muschl.) Baehni & MacBride

Cerrate 1583; 3384  
 Weberbauer 3101 (TYPE)

*D. ENGLERIANA* var. *DEVIA* (Baehni & MacBride) J. Duke

MacBride & Featherstone 566  
 Pennell 13462; 14655 (TYPE)  
 Tovar 1277B

*D. FASCICULATA* A. Gray

Cerrate 621; 3092  
 Ferreyra 7422  
 MacBride & Featherstone 187 (appr. *D. glandulosa*); 693  
 Pennell 14515  
 Wilkes Exped. s. n. (TYPE)

*D. FRUTESCENS* Mattf.

Weberbauer 7203 (TYPE)

*D. GLABERRIMA* Bartl.

Haenke s. n. (TYPE)  
 MacBride 3506  
 Woytkowski 34228 (???)

*D. GRANDIFLORA* Bartl.

Cerrate 1101  
 Ferreyra 6245; 8587 (appr. *D. glaberrima*)  
 Pennell 14724  
 Vargas 1903

*D. OVATA* Humb. & Bonpl. ex Roem. & Schult.)

Espinosa 199  
 MacBride & Featherstone 1714

*D. PAPOSANA* Phil.

Nuñez 4189 p. p.; 2430 (appr. var. *weberbaueri*)

*D. PAPOSANA* var. *WEBERBAUERI* (Muschl.) J. Duke

Cerrate 860  
 Ferreyra 1398; 2435; 3855; 6328 p. p.;  
 8025; 8695; 9580  
 Grant 7441, 7468

- MacBride 5863, 5904 (aber.) 5963  
 Miranda 0367  
 Pennell 14783  
 Soukup 2111  
 Stork, Horton & Vargas 9241  
 Stork & Vargas 9357  
 Weberbauer 1657  
 Worth & Morrison 15741 (appr. var. *paposana*)
- D. PAPOSANA var. SERRULATA J. Duke  
 Ferreyra 1497; 1515; 7234; 8816; 11616;  
 13428; 13490; 13522  
 Matthews 997  
 Worth & Morrison 15677
- D. PRAECOX Baehni & MacBride  
 Weberbauer 6916 (TYPE)
- D. ROTUNDIFOLIA A. Gray  
 Ferreyra 647; 6949; 7048; 8301  
 Killip & Smith 21761  
 MacBride & Featherstone 183; 261  
 Pennell 14390; 14516 p. p.  
 Savatier 373  
 Weberbauer 7397  
 Wilkes Exped. s. n. (TYPE)
- D. ROTUNDIFOLIA var. NITIDA (J. Ball) J. Duke  
 Ball, J. s. n. in 1882 (TYPE)  
 Balls, E. K. 6789  
 Cerrate 150; 627; 1376  
 Cook & Gilbert 615; 638  
 Ferreyra 3030 (appr. *D. glaberrima*);  
 7428  
 Killip & Smith 21810
- D. CORDATA (L.) Willd.  
 Bang 233  
 Buchtien 183 p. p. 255; 5405  
 Krukoff 10401  
 Rusby 1182  
 Steinbach 1922; 5442; 6216; 6269  
 Weddell 4591  
 Williams 56
- D. DIVARICATA var. STRICTA (Rusby) J. Duke  
 Tate 160 (TYPE)
- D. GLANDULOSA Presl  
 Bang 92 (appr. *D. cordata*); 1136  
 Buchtien 572  
 Cárdenas 609a; 2424  
 Eyerdam 24941; 24957  
 Fiebrig 2837  
 Hammarlund 404  
 Mandon 950
- MacBride 3506 (appr. *D. glaberrima*)  
 MacBride & Featherstone 188 (appr. *D. cordata*)  
 Nuñez 1313  
 Savatier, L. 372  
 Stafford s. n. (closely resembles Ball s. n. from Chicla)
- D. STEREOPHYLLA Mattf.  
 Balls, E. K. 7021, B7021  
 Goodspeed, Stork & Horton 11533  
 Killip & Smith 22132; 22134  
 MacBride & Featherstone 563; 962 (TYPE); 1761  
 Rose & Rose 18718  
 Stork 10925  
 Tovar 220  
 Weberbauer 6600 (TYPE: var. *extipulata*)
- D. VILLOSA Cham. & Schlecht.  
 Haenke s. n. (TYPE: *D. hirsuta*)  
 Killip & Smith 23212  
 MacBride 3266  
 MacBride & Featherstone 1543  
 Poeppig 1575  
 Vargas 2100
- D. VILLOSA ssp. PALUSTRIS  
 (Cham. & Schlecht.) J. Duke  
 Allard 21093  
 MacBride 4835  
 MacBride & Featherstone 1542 (TYPE: *D. sphagnophila*)  
 Stork & Horton 10479
- BOLIVIA
- d'Orbigny 1187  
 Steinbach 4011
- D. LADEWII Rusby  
 Tate 652 (TYPE)
- D. OVATA Humb. & Bonpl. ex Roem. & Schult.  
 Cárdenas 2332; 3379  
 Herzog 2390
- D. ROTUNDIFOLIA var. NITIDA (J. Ball) J. Duke  
 Mandon 948 (appr. *D. ovata*)
- D. VILLOSA Cham. & Schlecht.  
 Buchtien 183 p. p.  
 Mandon 949  
 Tate 928
- D. VILLOSA ssp. PALUSTRIS  
 (Cham. & Schlecht.) J. Duke  
 Rusby 1183

## CHILE

## D. PAPOSANA Phil.

Jaffuel 1025; 1033 (appr. *D. rotundifolia*); 2549  
Johnston 3620; 5213

## PARAGUAY AND URUGUAY

## D. CORDATA (L.) Willd.

Balansa 2273; 4586  
Bartlett 21026  
Jorgenson 4016

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## D. CORDATA (L.) Willd.

Berthaud-Caulon 538  
Broadway 27  
Focke 302  
Hering & Dieperink 113  
Hostmann 714a

Maguire & Fanshawe 23562  
Mell 232  
Persaud 165  
Schomburgk 930  
Sieber 392

## BRAZIL

## D. CORDATA (L.) Willd.

Baduin, J. 3090  
Barreto, M. 1418  
Blanchet 208; 1218  
Burchell 1011; 9710-2; 10071  
Dusen 6667; 14165  
Gardner 317  
Glaziou 5746  
Irwin 2184  
Klein 443  
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Netto 124  
Pickel 2737  
Piers & Black 632  
Puiggari 2936  
Reineck & Czermak 47  
Riedel 704; 790  
de Sampaio 1579; 1964  
Segadas-Vianna 2642  
Splitgerber 216  
Spruce 216  
Smith & Reitz 8799

## ARGENTINA

## D. CORDATA (L.) Willd.

Budin 14001  
Burkart 7276  
Lorentz & Hieronymus 1123  
Parodi 9080  
Venturi 5104; (var. *pacifica*); 5911;  
8018

Jorgensen 1172  
Parodi 8038  
Pierotti, S. A. 1994  
Schreiter 10960  
Schulz 977  
Venturi 3685; 9430

## D. GLANDULOSA Presl

Eyerdam & Beetle 22360  
Hieronymus 233

## D. OVATA Humb. &amp; Bonpl. ex Roem. &amp; Schult.

Venturi 2900; 4421

## ASIA AND OCEANIA

## D. CORDATA (L.) Willd.

Backer 10294, 32379, 32380 (all var. *pacifica*); 8642 (appr. *D. diandra*)  
Bakhuizen 28a (var. *pacifica*)  
Buchtien 693, 795 (var. *pacifica*)  
Bunnemeyer 11072  
Cid 20 (var. *pacifica*)  
Dames 85

Degener 12345 (var. *pacifica*)  
Edaño 1480, 11845 (both var. *pacifica*)  
Flecker 3184  
Heller 2639  
Hochreutiner 106, 1090  
Kakah 53 (var. *pacifica*)  
Koorders 16539b; 16540b; 43293b (all var. *pacifica*)

Meebold 21805 (var. *pacifica*)  
 Nodi & Idjan 253  
 Nur, Md. 34319  
 Ottolander 246 (var. *pacifica* appr. ssp. *diandra*)  
 Posthumus 3459 (var. *pacifica*)  
 Purselove 4322 (var. *pacifica*)  
 Schiffner 1956; 1958; 1960; 1961 (var. *pacifica*)  
 St. John 9938  
 St John & Catto 17850  
 Steiner 34787  
 Topping 2999  
 Van Royen 4312  
 Womersley & Van Royen 5911 (var. *pacifica*)  
 Womersley, Hoogland & Taylor 4909 (var. *pacifica*)

D. CORDATA ssp. DIANDRA (Blume) J. Duke

Balapur 570  
 Biswas 4445  
 Bloembergen 3371  
 Bodinier 361  
 Boea 8482; 8653; 8921  
 Bon 5837  
 Boswezen 3065; 3317  
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 Hoogland & Pullen 5293  
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 Kajewski 2176  
 Kalkman 4526  
 Kanehira & Hatusima 13422  
 Kaudern 168  
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## SANANGO: NEW AMAZONIAN GENUS OF LOGANIACEAE

GEORGE S. BUNTING AND JAMES A. DUKE

### ABSTRACT

The new genus, *Sanango*, shows affinity to the genera *Buddleja*, *Nuxia* and *Peltanthera*, of the Loganiaceae, though the five-lobed corolla with only four stamens is more characteristic of other families, such as the Scrophulariaceae. Various features of *Sanango durum* are discussed and illustrated. GEORGE S. BUNTING, L. H. Bailey Hortorium, Cornell University, Ithaca, New York; JAMES A. DUKE, Missouri Botanical Garden, 2315 Tower Grove Ave., St. Louis 10, Missouri.

Among recent collections of Felix Woytkowski from Amazonian Peru is a specimen of a plant that appears to be intermediate between the families Loganiaceae and Scrophulariaceae! It is a fine example of the situation which has led to the widespread view that the Loganiaceae are an artificial group constituted primarily of genera excluded for one reason or another from other well-marked, natural families. There is still ample cause to argue this case, for there is no obvious "family resemblance" to guide us, and often the circumscription of the family is inadequate to positively include or exclude an unknown plant.

A century ago George Bentham (Jour. Linn. Soc. Bot. 1:52-114. 1854) wrote: "There can be no doubt that Rubiaceae, Apocynae, Gentianeae, and Scrophularineae are large independent orders indicated in nature, yet those genera now amalgamated under the name of Loganiaceae bind them so firmly together, that some of these genera will be found even more closely allied to certain others of each of the above orders respectively than they are to each other." And he continues: "The Loganiaceae lie very near to some part or other of the vast family of Rubiaceae, but by their free ovary, they are absolutely, and by very few exceptions, clearly separated. The connecting genera with the Apocynae, Gentianeae, and Scrophularineae are on the other hand, much fewer, but their union is much closer. With Scrophularineae in particular, although the general affinity is more remote, the few intermediate genera and species are intermediate in every respect, in habit as in technical characters. The main distinction, the presence of stipules in Loganiaceae, disappears very gradually, and the difficulty of drawing the line is the greater from there being no habit or family resemblance to unite the several members of the Loganiaceae."

It is in this paper that Bentham discussed the similarity of the genus *Buddleja* (previously included in Scrophulariaceae) to *Logania*, and concluded the necessity to place them together, along with the genus *Polypremum*, in the family Loganiaceae.

Now we have discovered another plant that seems to stand nearly between the Loganiaceae and Scrophulariaceae. The fruiting specimen has a distinct aspect of *Buddleja*, but several technical features prevent its inclusion in that genus. It is equally, if remotely, allied to the genus *Peltanthera*. After thorough study of this plant, and consultation with N. Y. Sandwith at Kew, and J. J. Wurdack at Washington, we are convinced that it represents an unnamed genus, and describe it as new.

*Sanango* Bunting et Duke, gen. nov.

Arbores parvae ligno valde duro, foliis oppositis petiolatis binis lineis conjunctis. Flores in thyrsis bracteolatis, calyce ad medium lobato, segmentis lanceolatis subaequalibus, corolla 5-lobata,  $\pm$  hypocrateriformi, gibbosa, segmentis rotundatis subaequalibus, aestivatione cochleari, staminibus 4 (!) sub sinibus prope tubi basim affixis, filamentis inflatis, antheris subrotundis singulatim 2-theas ferentibus, introrsis versatilibus in linea  $\pm$  hippocrepiformi aperientibus, staminodio parvulo, ovario globoso leviter 4-lobato biloculari disco cupuliformi circumdato placentis axillaribus multiovulatis, stylo brevissimo, stigmate capitato bilobato. Capsula polysperma septicidalis, utroque carpello iterum scisso.

*Sanango durum* Bunting et Duke, sp. nov.

Arbor 16 m. alta ramulis lenticellatis. Foliorum lamina 10–25 cm. longa 4–7 cm. lata elliptica vel anguste obovata ad apicem acuminata, ad basim cuneata vel attenuata, parce et inaequaliter denticulata praecipue in dimidio superiore, venis lateralibus utrinque 5–7 arcuatis ascendentibus, infra pallida venis strigulosis instructa; petiolus 0.5–1.0 cm. longus, ad basim latus, facie adaxiali velutina ferruginea. Inflorescentia 5–12 cm. longa terminalis vel axillaris  $\pm$  secunda, pedunculo et pedicellis strigulosis, pedicello ca. 1 mm. longo; florum calyces ca. 3.5 mm. longi puberuli lobis 5 acutis 1.5–2 mm. longis; corollae albae aliquantum carnosae, ca. 1.2 cm. longae extus puberulae et glanduloso-puberulae, intus glanduloso-puberulae et etiam pilosae in tubi basi, lobis ca. 3–4 mm. longis; filamentorum staminalium partes liberae pilulosae vix 2.5 mm. longae antheris ca. 0.5 mm. latis brevioribus quam latis; staminodium parvulum vix 0.2 mm. longum; ovarium globosum ca. 1 mm. longum, disco cupuliformi tam procero atque ovario; stylus crassus persistens, una cum stigmate magno ca. 1 mm. longus. Capsula ellipsoidea vel anguste obovoidea ca. 3.5–4.0 mm. lata parietibus osseis; semina orthotropa  $\pm$  elongata fusiformia ca. 0.7 mm. longa recta vel sigmoidea.

Type collection: *Felix Woytkowski 5619*, "tree 12 m. tall; no latex; flowers white; in forest, elev. 300 m.; Aramango, s. of Nazaret," depto. Amazonas, Peru; 2 April 1960 (HOLOTYPE MO, isotype K, US).

Distribution: Forests between 300 and 750 m. elevation, west central Amazonas and central Junín, Peru. These localities are separated by nearly 500 air miles. It seems plausible that the distribution may be more or less continuous between these points.

PERU: Junín: Satipo, Aug. 1960, *Woytkowski 5925* (MO).

Vernacular name: "Sanango" (Amazonas).

The generic name *Sanango* is the colloquial name furnished by the collector of this plant. It is a corruption of a Quechuan word, "sanangu", an Indian word applied also to species of *Tabernaemontana*, *Rauwolfia*, and *Malpighia*. The specific epithet refers to the hard wood to which Woytkowski called attention in his field notes. Untreated, the wood disfigures a razor blade when one attempts to cut a hand section.

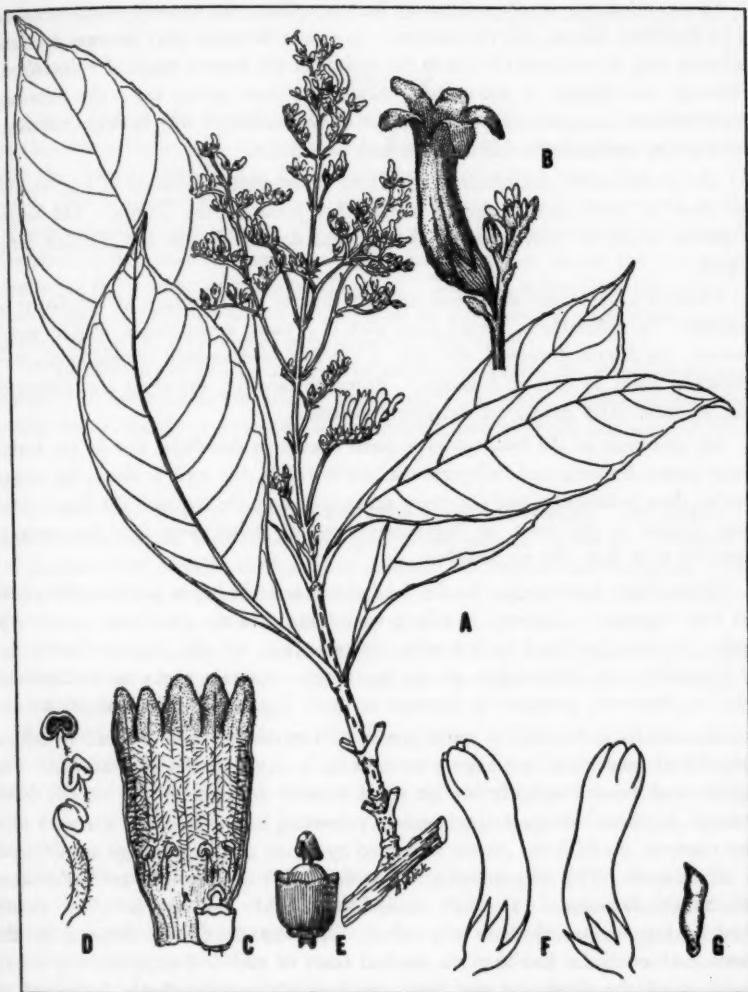


Figure 1. *Sanango durum* Bunting & Duke. a. flowering branch b. flower c. flower with corolla cut open d. stamen from young flower bud, with adaxial view of young anther (center) and anther after dehiscence (top) e. enlargement of pistil, ovary nearly covered by cup-like disk f. diagrams of a single flower bud from opposite sides illustrating aestivation. g. seed

*Sanango* belongs to the subfamily Buddlejoidae. Its nearest relatives appear to be *Buddleja*, *Nuxia*, and *Peltanthera*. It should be noted that *Sanango* has been collected only in localities that lie in the middle of the known range of *Peltanthera*.<sup>1</sup> Although the affinity is not strong, these latter two genera share the following characteristics: hippocrepiform dehiscence of the anthers, a disk between the ovary and corolla, multicellular hairs, and a lack of stipules.

The combination of characters occurring in *Sanango* is unusual in Loganiaceae, but most of them occur singly in some other genus of the family. The hippocrepiform mode of dehiscence of the stamens occurs also in the African genus *Nuxia*.

There is a very well developed annular disk of firm texture in the flower of *Sanango*. In *Peltanthera*, a very short disk is present, conspicuous only in young flowers. In *Nuxia*, however, the disk is annular, and though membranous, very similar in form to that in *Sanango*.<sup>2</sup> Notwithstanding, the style and stigma of each of these three genera are extremely different.

An approach to the *Sanango*-type pistil occurs in *Buddleja*, and in the herbaceous genera *Mitreola* and *Polyphremum*. In *Mitreola*, the style is short, the stigma smaller than in *Sanango*, and the ovary splits in two at the top as it develops. Even more similar is the fruit of *Polyphremum* which splits into four segments at maturity as it does also in *Buddleja*.

Multicellular hairs similar to the dendroid or branched type in *Peltanthera* have not been observed in *Sanango*, nor have we encountered the glandular, peltate type similar to those described by Solereder (Pflanzenfam. 4<sup>(2)</sup>:23, fig. 12. 1892) and by Hunziker and Fulvio (op. cit. in footnote). Certain types of multicellular hairs are, however, common in *Sanango* on both vegetative and floral parts.

The corolla is 5-lobed in some genera of Loganiaceae and 4-lobed in others. Indeed both conditions are known to exist in a single species of *Buddleja*. The loganiaceous flower typically has an equal number of stamens and corolla lobes. *Sanango* is unique<sup>3</sup> in the Loganiaceae in possessing a five-lobed corolla with only four stamens, the fifth one merely suggested by a very small appendage not apparent in all flowers. This characteristic is typical of such families as Verbenaceae and Scrophulariaceae. We feel, nonetheless, that *Sanango* is more closely allied to Loganiaceae than to any other. Such an opinion is dictated by the presence of a stipular line between the leaf bases of each leaf pair, and the strong similarity of the pistil and the fruits to *Buddleja*, which clearly is related to *Logania*. The more or less irregular nature of the corolla in aestivation, and the reduction of one stamen in *Sanango* decidedly suggest Scrophulariaceae. There is,

<sup>1</sup> In their excellent paper on *Peltanthera*, Hunziker and Fulvio (Bol. Acad. Nac. Ci. Cordoba 40: 217-228. 1957) noted that the genus is known from Costa Rica, Peru, and Bolivia. During the course of this study we have encountered the collection of A. E. Lawrence (no. 432; ca. 100 mi. n.w. of Bogota, depto. Boyaca, Colombia) which clearly represents *P. floribunda* Benth. as circumscribed in that paper. The Colombian specimen agrees in all its floral measurements with those cited by Hunziker and Fulvio for Costa Rican specimens, with the exception of the placentae which seem to extend at least half the length of the ovary as is characteristic of the Bolivian specimen.

<sup>2</sup> The ovary of *Nuxia floribunda* Benth. is deeply two-lobed, which, surrounded by the annular disk, is very suggestive of *Rauwolfia* and other Apocynaceae.

<sup>3</sup> In the African genus *Usteria*, three of the four stamens regularly abort.

however, no tendency toward didynamy of the stamens, as is characteristic of the latter group.

#### AESTIVATION

Aestivation of the flowers of this genus is cochlear, i.e., one corolla lobe is interior, one exterior, and the other three have one edge overlapping and exposed with the opposite edge hidden by the adjacent overlapping lobe (Fig. 1f). The corolla tube is gibbous near the base, and the flower appears to be oriented so that the interior corolla lobe and the gibbous side of the tube are uppermost (adaxial). The vestigial fifth stamen arises on the gibbous side, below one of the two sinuses adjacent to the interior corolla lobe (Fig. 1c). The bud is distinctly zygomorphic, more so than in *Peltanthera*. It is impossible to ascertain from the dried material to what degree the open flower may show this character.

We are unaware of an identical type of aestivation among the other Loganiaceae, though it is not uncommon among the dicots. The usual pattern in five-lobed corollas of this family is with two lobes external, two internal, and one imbricate.

#### VESTURE

At least four types of multicellular hairs occur in *Sanango*. The largest are present on the adaxial face of the basal part of the petiole. These are composed of 3-5 elongate, hyaline cells, the basal one inflated, the terminal one attenuate (Plate IVa). Very young stems and leaves are clothed with hairs of a similar type, a few of which persist on the veins on the lower surface of the mature leaves.

The calyx bears hairs of similar structure, but very much smaller than those described above. In some, however, it appears that the terminal cell is slightly inflated (Plate IVb).

Both surfaces of the corolla are very hairy (Plate IVc). The outside is closely covered by very small, mostly 3-celled attenuate hairs similar in form to those of the leaves, and intermixed with these are some still shorter gland-tipped hairs (Plate IVe). The glandular tip cell is opaque, borne upon a greatly inflated, hyaline basal cell.

The inside of the corolla bears 3-4-celled, gland-tipped hairs about twice as long as those on the outside of the corolla (Plate IVc). [The glandular tip may be composed of several cells arranged radially, but the small size of the structure has prevented us from ascertaining its exact nature. Some lobing is apparent in certain preparations.] In addition, there are many very long, slender hairs in the throat of the corolla that appear to have no cross walls dividing them into cells (Plate IVd).

#### POLLEN

A pollen sample was sent to Dr. G. Erdtman for study. He reports that "the grains are small, uninteresting from a morphological point of view, and similar to those in *Peltanthera* . . ." His diagnosis follows: "Pollen grains small, 3-colporate (about  $15 \times 12.5$ ). Colpi about  $12 \mu$  long. Ora about  $2.5-3 \mu$  high. Exine thin. Sexine of about the same thickness as nexine. [No pattern or traces of bacula etc. could be seen even by means of an apochromatic objective with the numerical

aperture 1.40. The pollen grains in *Peltanthera costaricensis* are equally 3-colporate and measure about  $15 \times 11 \mu$ ; the exine seems to be very minutely reticulate.]”

#### ANATOMICAL CONSIDERATIONS

Dr. Stern, U. S. National Museum, plans to do a detailed anatomical study of the wood of this genus. We wish, however, to point out that there appears to be no included phloem in this species, which is the typical condition in the Buddlejoidae. This contrasts strongly with the intraxylary phloem present in members of the Loganioidae (Metcalf and Chalk 2:931. 1950). The wood does not appear to differ strikingly from that of *Peltanthera*.

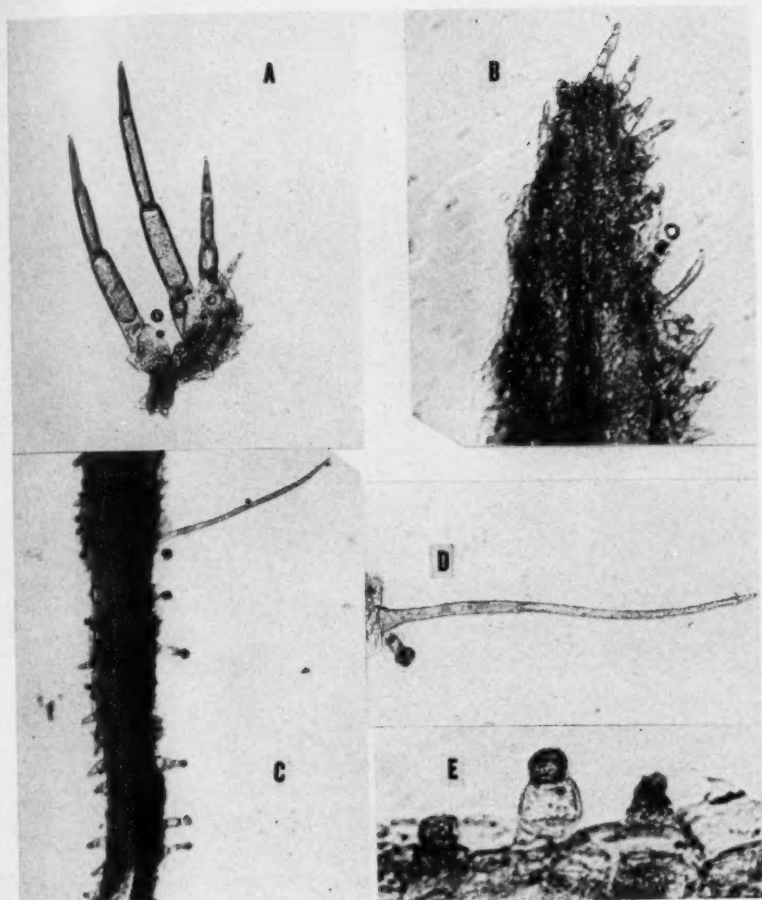
#### EXPLANATION OF PLATE

##### PLATE IV

#### Types of trichomes in *Sanango*

- a. from adaxial face of petiole b. on calyx c. on corolla, exterior (left) and interior (right) [a-c all at same scale] d. enlargement of long hair on interior of corolla, a single short gland-tipped one at its base (note the apparent lobing of the glandular tip) e. enlargement of a single gland-tipped hair on exterior of corolla





BUNTING & DUKE—SANANGO



